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Prenatal Nutrition

A Clinical Manual

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Prenatal Nutrition: A Clinical Manual

Prenatal Task Force of Maternal and Child Health,
Bureau of Community Health Programs,
Massachusetts Department of Public Health

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The second edition of the Prenatal Manual would not have been possible without the encouragement and support of Florence Petersen, Assistant Director for Program and Nutrition. We would like to extend a special thanks to Anna Marie Rosher, Nutrition Education Specialist, and Constance Callahan, Administrative Assistant.

First Edition (1980)

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Contributing authors of the first edition were members of a Prenatal Task Force established in 1977 by Maternal and Child Health, Division of Family Health Services, Massachusetts Department of Public Health.

INTRODUCTION

In the fall of 1977, a task force of WIC* and Title V** nutritionists met to revise current prenatal nutrition assessment forms. In the course of several meetings, we decided to write a manual to accompany the forms.

We felt that much of our knowledge about prenatal nutrition care was gained through experience. In order to be successful nutrition counselors, we struggled to integrate nutrition, medicine and psychology. We searched for ways to explain the importance of nutrition during pregnancy to the women we saw every day. We dug for the answers to questions we didn't know ourselves. We continually watched for good teaching aids and we created our own. We carried on continuing dialogue about nutrition issues – weight gain, preeclampsia, "junk" foods, breastfeeding – with the physicians and nurses in our clinics.

We wanted one book to turn to, instead of searching for answers in a dozen books, which were spread all over our desks before we were through. And so Prenatal Nutrition: A Clinical Manual was conceived. It includes theoretical background, technical information and practical counseling techniques for the main aspects of nutrition care during pregnancy. It addresses problems and questions commonly encountered during nutrition counseling of pregnant women. Graphics that have helped pregnant women understand nutrition concepts have been included, as well as listings of films, teaching aids, pamphlets, and books.

In this revised edition, we have striven to present current information about the myriad of issues that affect nutritional status during pregnancy and its outcome. A new chapter on *Lead Exposure and Pregnancy* has been included and other chapters have been updated to incorporate recent research findings.

We hope this manual will be a resource for all health practitioners who are concerned about effective day-to-day nutrition care during pregnancy.

*WIC - Special Supplemental Food Program for Women, Infants and Children.

**Title V of the Social Security Act provides health care to low income mothers and children under Maternal and Infant Care and Children and Youth Projects. Title V nutritionists are often called MCH nutritionists.

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NUTRIENT NEEDS DURING PREGNANCY

1

INTRODUCTION

This section reviews the needs of pregnant women, nutrient by nutrient. The amounts of each nutrient suggested as necessary during pregnancy are based on the Recommended Dietary Allowances (RDA) of the Food and Nutrition Board of the National Academy of Sciences. However, when counseling pregnant women, the following should be considered:

- The RDA's are recommendations for healthy population groups, rather than individuals. They may exceed the needs of individuals since they are set up to ensure the need of an entire population.
- For some nutrients, the additional amount recommended during pregnancy depends on the age or pregravid body weight of the individual.
- Making dietary recommendations nutrient by nutrient is usually impractical in a counseling situation. For this reason, a food guide which meets the RDA's is included in this section. Food guides make education about diet during pregnancy easier and more realistic.

ENERGY

During pregnancy, additional kilocalories (kcal) are required for maternal energy needs and fetal growth. If enough kcal are not consumed, protein required for fetal and maternal growth is oxidized for maternal energy. At inadequate energy levels fat may also be oxidized, possibly producing ketonemia as evidenced by acetonuria. Ketones crossing the placenta may cause neurological damage to the fetus. Gestational acetonuria has been associated with significant decrease in IQ scores in offspring (1). A recent study indicates that even short-term caloric deprivation, as in meal skipping, may result in ketonemia and should be avoided (2).

The energy requirements of pregnancy are increased by 15% over nonpregnant requirements, according to the RDA. An estimated 300 additional kcal are needed per day. WHO (World Health Organization) recommends 150 kcal/day extra during the first trimester and 350 kcal/day extra during the second and third trimester. The extra energy is primarily used for maternal growth (placenta, uterus, breasts, stores) in the second trimester and for fetal growth in the third trimester. Energy levels below 36 kcal/kg (16 kcal/lb) of pregnant body weight can seriously affect nitrogen utilization for protein synthesis.

Recommendations for kcal should be based on the woman's age, body size, pregravid weight, existing pathological conditions and activity levels. In most cases, a gradual, steady weight gain of 24-30 lbs is the best evidence that sufficient kcal are being consumed. However, adolescents and underweight women (10% or more below standard

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES,[a] Revised 1980

Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Protein (g)	Fat-Soluble Vitamins: Vitamin A (μg RE)[b]	Fat-Soluble Vitamins: Vitamin D (μg)[c]	Fat-Soluble Vitamins: Vitamin E (mg α-TE)[d]	Water-Soluble Vitamins: Vitamin C (mg)	Water-Soluble Vitamins: Thiamin (mg)	Water-Soluble Vitamins: Riboflavin (mg)	Water-Soluble Vitamins: Niacin (mg NE)[e]	Water-Soluble Vitamins: Vitamin B-6 (mg)	Water-Soluble Vitamins: Folacin[f] (μg)	Water-Soluble Vitamins: Vitamin B-12 (μg)	Minerals: Calcium (mg)	Minerals: Phosphorus (mg)	Minerals: Magnesium (mg)	Minerals: Iron (mg)	Minerals: Zinc (mg)	Minerals: Iodine (μg)
Infants	0.0–0.5	6	13	60	24	kg × 2.2	420	10	3	35	0.3	0.4	6	0.3	30	0.5[g]	360	240	50	10	3	40
	0.5–1.0	9	20	71	28	kg × 2.0	400	10	4	35	0.5	0.6	8	0.6	45	1.5	540	360	70	15	5	50
Children	1–3	13	29	90	35	23	400	10	5	45	0.7	0.8	9	0.9	100	2.0	800	800	150	15	10	70
	4–6	20	44	112	44	30	500	10	6	45	0.9	1.0	11	1.3	200	2.5	800	800	200	10	10	90
	7–10	28	62	132	52	34	700	10	7	45	1.2	1.4	16	1.6	300	3.0	800	800	250	10	10	120
Males	11–14	45	99	157	62	45	1000	10	8	50	1.4	1.6	18	1.8	400	3.0	1200	1200	350	18	15	150
	15–18	66	145	176	69	56	1000	10	10	60	1.4	1.7	18	2.0	400	3.0	1200	1200	400	18	15	150
	19–22	70	154	177	70	56	1000	7.5	10	60	1.5	1.7	19	2.2	400	3.0	800	800	350	10	15	150
	23–50	70	154	178	70	56	1000	5	10	60	1.4	1.6	18	2.2	400	3.0	800	800	350	10	15	150
	51+	70	154	178	70	56	1000	5	10	60	1.2	1.4	16	2.2	400	3.0	800	800	350	10	15	150
Females	11–14	46	101	157	62	46	800	10	8	50	1.1	1.3	15	1.8	400	3.0	1200	1200	300	18	15	150
	15–18	55	120	163	64	46	800	10	8	60	1.1	1.3	14	2.0	400	3.0	1200	1200	300	18	15	150
	19–22	55	120	163	64	44	800	7.5	8	60	1.1	1.3	14	2.0	400	3.0	800	800	300	18	15	150
	23–50	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	18	15	150
	51+	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	10	15	150
Pregnant						+30	+200	+5	+2	+20	+0.4	+0.3	+2	+0.6	+400	+1.0	+400	+400	+150	[h]	+5	+25
Lactating						+20	+400	+5	+3	+40	+0.5	+0.5	+5	+0.5	+100	+1.0	+400	+400	+150	[h]	+10	+50

[a] The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for detailed discussion of allowances and of nutrients not tabulated. See Table 1 (p. 20) for weights and heights by individual year of age. See Table 3 (p. 23) for suggested average energy intakes.

[b] Retinol equivalents. 1 retinol equivalent = 1 μg retinol or 6 μg β carotene. See text for calculation of vitamin A activity of diets as retinol equivalents.

[c] As cholecalciferol. 10 μg cholecalciferol = 400 IU of vitamin D.

[d] α-tocopherol equivalents. 1 mg *d*-α tocopherol = 1 α-TE. See text for variation in allowances and calculation of vitamin E activity of the diet as α-tocopherol equivalents.

[e] 1 NE (niacin equivalent) is equal to 1 mg of niacin or 60 mg of dietary tryptophan.

[f] The folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay after treatment with enzymes (conjugases) to make polyglutamyl forms of the vitamin available to the test organism.

[g] The recommended dietary allowance for vitamin B-12 in infants is based on average concentration of the vitamin in human milk. The allowances after weaning are based on energy intake (as recommended by the American Academy of Pediatrics) and consideration of other factors, such as intestinal absorption; see text.

[h] The increased requirement during pregnancy cannot be met by the iron content of habitual American diets nor by the existing iron stores of many women; therefore the use of 30–60 mg of supplemental iron is recommended. Iron needs during lactation are not substantially different from those of nonpregnant women, but continued supplementation of the mother for 2–3 months after parturition is advisable in order to replenish stores depleted by pregnancy.

Source: Committee on Dietary Allowances, Food and Nutrition Board, National Research Council: **Recommended Dietary Allowances**, ninth edition Washington, D.C.: National Academy of Sciences, 1980.

weight for height) need to gain at a greater rate than average. Adolescents should gain the pregnancy requirement in addition to normal weight gain for their age. Underweight women should gain the pregnancy requirement in addition to an amount bringing them up to normal weight for height. These groups need special encouragement to consume sufficient, additional kilocalories (3).

It has been estimated that pregnant women over age 35 need somewhat fewer calories (4% less) than younger women because of a decline in resting metabolism. However, their nutrient needs are not correspondingly lower. Thus, in order to meet nutrient requirements without exceeding current recommendations for weight gain, foods of high nutrient density should be emphasized.

PROTEIN

Protein plays a major role in pregnancy outcome since it is necessary for maternal tissue growth (breast, uterus, placenta, increased blood volume) and fetal growth. An increased need for protein begins during the second month and steadily rises throughout pregnancy. Excess protein during early pregnancy may be stored in skeletal muscle for use later in pregnancy.

The RDA of 74-76 grams of protein (depending on age) per day represents a 60% increase (30 grams) over non-pregnant requirements. Epidemiological studies show that pregnant women freely selecting their own diets consume between 70-90 gm of protein daily (4). Many practitioners recommend the higher amounts of protein (90 gm +).

Based on body size, individual needs are as follows: (4)

Mature women:	1.3 gm protein per kg pregnant body weight
Adolescent girls (15-18 yrs.):	1.5 gm protein per kg pregnant body weight
Younger than 15 yrs.:	1.7 gm protein per kg pregnant body weight

Women with chronic debilitating conditions such as GI pathology or infections should be especially careful to consume adequate protein.

The RDA's are calculated on a mixed diet in which at least one third of the protein is of high biological value (contains adequate amounts of all essential amino acids). These proteins include poultry, eggs, dairy products, meat, fish and soy protein.

IRON

Iron is essential during pregnancy for the manufacture of fetal and maternal hemoglobin and for storage in the fetus and the placenta.

The fetus accumulates most of its iron during the last trimester. The fetus will act as a parasite, depleting the mother of iron for the manufacture of its own hemoglobin. Newborns of iron-deficient mothers have normal hemoglobin values. Premature infants tend to be anemic because they have had less time than term infants to accumulate iron.

Estimates of the total iron used by the fetus and the mother range from 670–800 mg. Most of this is used in the last half of pregnancy when fetal transfer and maternal manufacture of hemoglobin take place. About 5–7 mg per day of absorbed iron (during the last two trimesters) is necessary to equal the amount used for fetal and maternal demands and for losses through the skin, gut and kidneys (5,6). To absorb 5–7 mg of iron, 50–70 mg of iron (at 10% absorption) must be provided daily in the diet!

A pregnant woman has some resources to meet these increased demands for iron. They include:

- iron conserved during pregnancy through cessation of menstruation (10–30 mg per month); (7)
- absorption rate — the average non-pregnant absorption rate for iron is 10%. During pregnancy the rate may increase (up to 30%); (8)
- iron stores — in most women these average 300 mg or less; (5)
- diet, providing approximately 6 mg of iron per 1000/kcal. For a normal pregnancy diet of 2300 kcal, about 12–14 mg dietary iron would be provided daily.

For a few women, these resources may be enough. However, most women probably do not have the body stores or the diet to meet the increased demands for iron.

On the basis of these facts, the National Academy of Sciences recommends supplements during pregnancy of 30–60 mg elemental iron daily. Most prenatal vitamin/mineral supplements contain 30–60 mg elemental iron. Iron can also be obtained from ferrous salts. The amount of elemental iron varies in these salts, ranging from 11% - 33%. (For treatment of anemia and analysis of laboratory values, see **Anemias of Pregnancy**.)

Women should still be advised to each rich dietary sources of iron and sources of vitamin C which aid in iron absorption. Iron cookware also transfers some iron to food. (See **Anemias of Pregnancy** for more information.)

CALCIUM

Calcium is necessary during pregnancy for fetal bone and toothbud formation and for replenishment of maternal reserves. The fetus will use skeletal reserves in the mother if maternal calcium intake is low. Calcium is also stored in the mother's bones in preparation for lactation.

Figures 1-1, 1-2 and 1-3 are useful when explaining fetal life to pregnant women. Showing women how their babies "eat" and "breathe" often makes the importance of good nutrition more immediate. These three drawings can be used together or separately. Figure 1-1 shows the placement of the fetus and placenta in the woman's body. Figure 1-2 gives a closer view of the placenta in relationship to the fetus. Figure 1-3 shows a cross section of the placenta. It can be used for explaining nutrient transport in slightly greater detail.

Fig. 1-1. FETUS AND PLACENTA AT NINE MONTHS

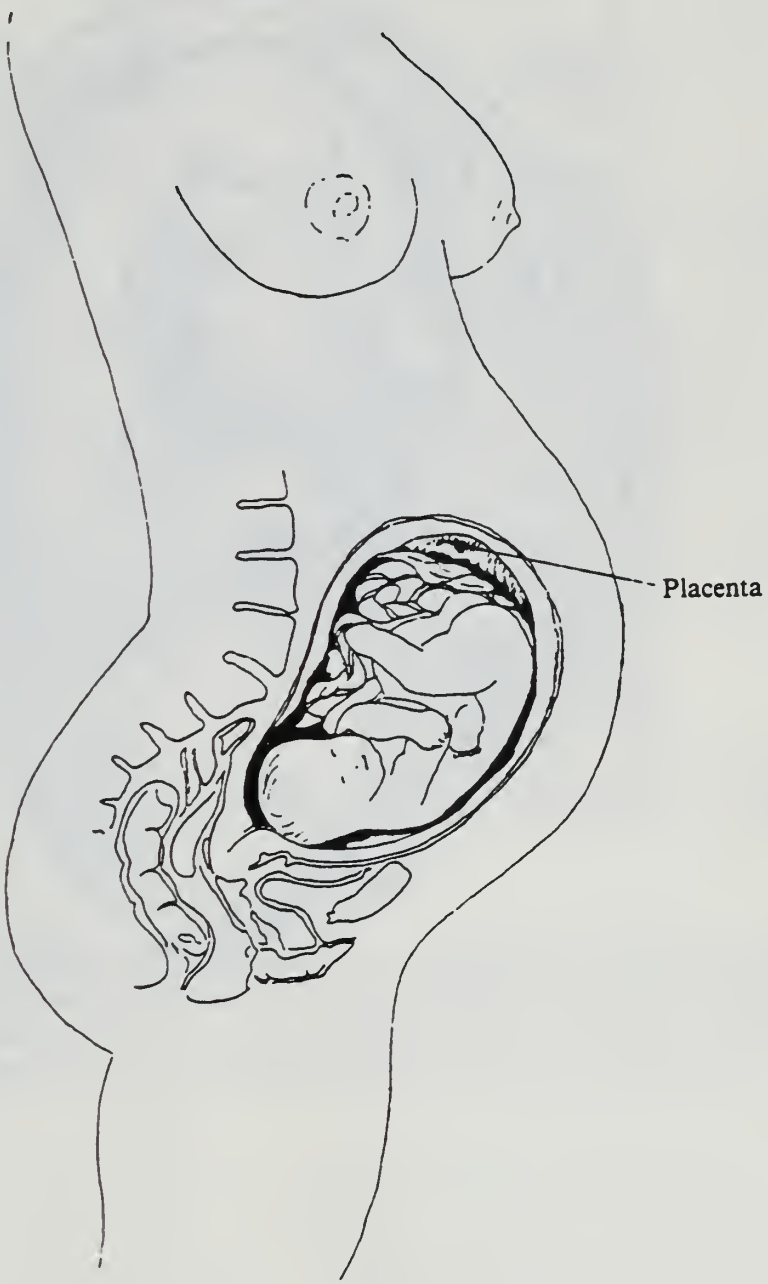


Fig. 1-2. FULL-TERM FETUS IN UTERO

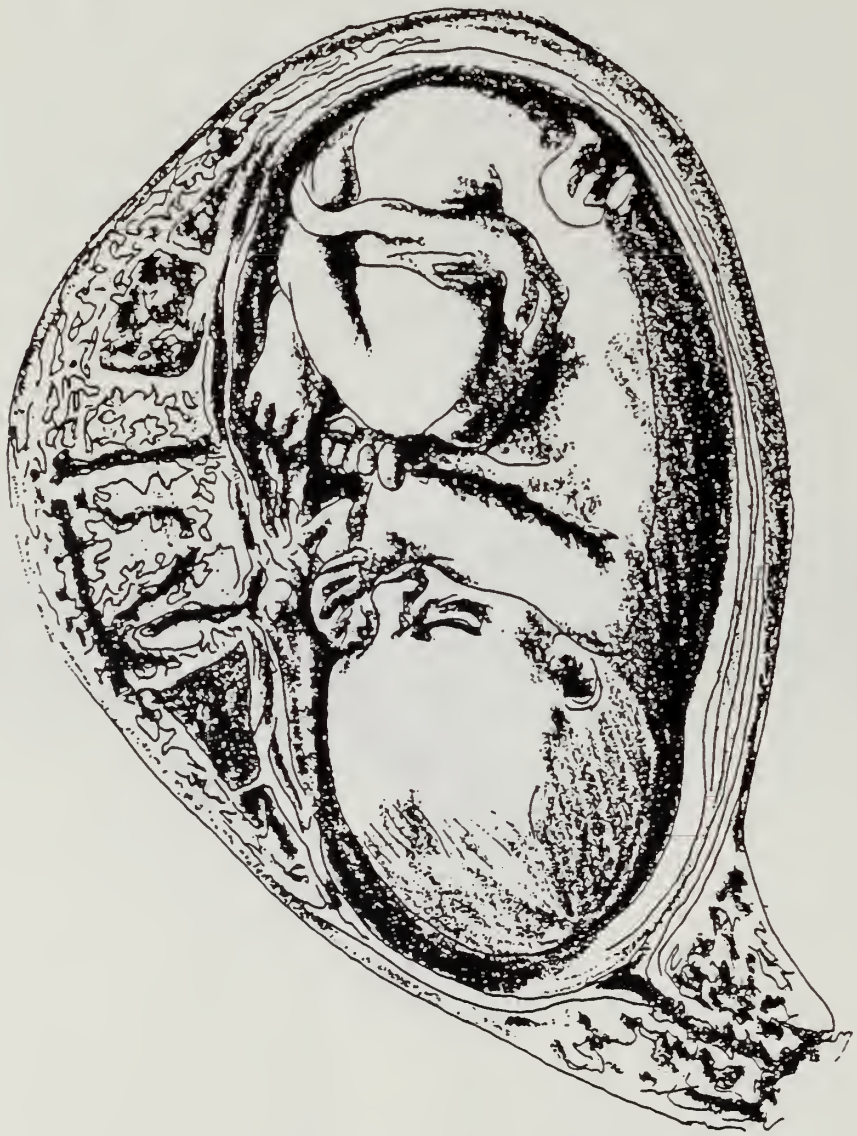
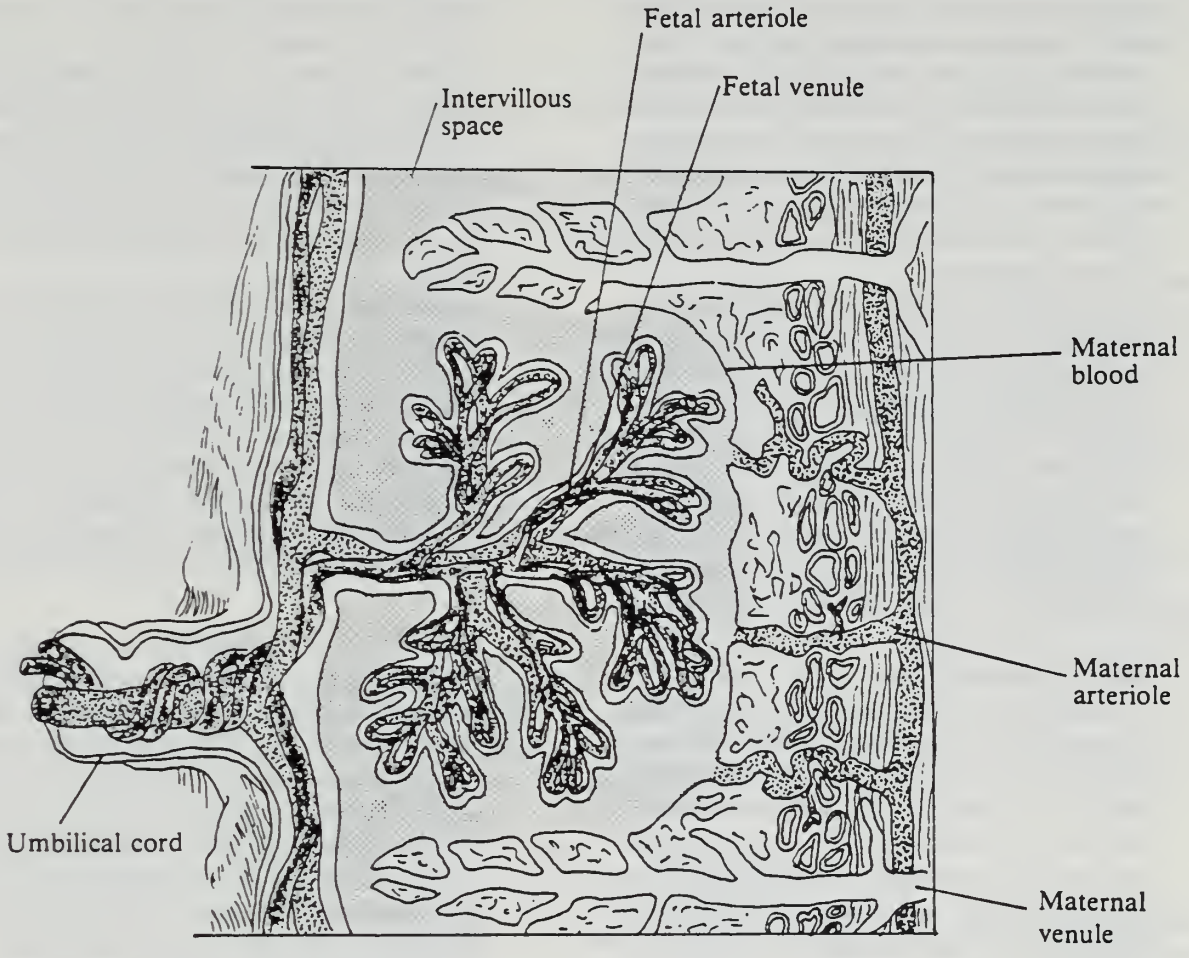


Fig. 1-3. CROSS SECTION OF PLACENTA



Nutrients and oxygen in maternal blood travel from maternal arterioles to the intervillous spaces. These substances then pass from the intervillous space to fetal venules. The umbilical vein carries them to the fetus. Deoxygenated fetal blood and waste products travel from the fetus through the umbilical arteries to fetal arterioles. They then pass into the intervillous space and then to maternal circulation.

Reprinted with permission from Spence, A.P. and Mason, E.B.:
Human Anatomy and Physiology. Menlo Park, California:
The Benjamin/Cummings Publishing Co., Inc., 1979, p. 799, fig. 2912.

Significant storage in the first and second trimester may take place in the maternal skeleton to provide some calcium for fetal calcium deposition which occurs primarily in the last trimester. Approximately 13 mg of calcium per hour is drawn from the maternal blood supply during this time, amounting to 250–300 mg per day.

The significance of low calcium intakes is unresolved. Intakes vary widely throughout the world, often without apparent ill effects. Some possible problems associated with very low calcium intakes include depletion of maternal calcium stores and increased chances of osteoporosis in later life (8). Increased dental caries during pregnancy are not due to low calcium intake but rather to a slight increase in salivary pH, an increase in plaque and an increase in bacterial activity due to hormonal changes.

The RDA for calcium during pregnancy is 1200 mg per day, an additional 400 mg over the RDA for non-pregnant women. Milk and milk products are the best sources of calcium. Legumes, nuts, dried fruits, soy tofu and whole small fish also provide significant amounts of calcium. Dark green leafy vegetables and breads and cereals also contain calcium; it is now thought that the binding of calcium by oxalic and phytic acid in these foods is not significant if sufficient calcium is consumed.

Calcium Absorption

Calcium is absorbed more efficiently during pregnancy because of the mediating influence of HCS (human chorionic somatomammotrophin) and estrogen. Calcium absorption is also affected by other factors including hormones (parathyroid hormone and calcitonin and during pregnancy by HCS and estrogen), the calcium/phosphorus (Ca:P) ratio, vitamin D, and dietary levels of protein and calcium.

Calcium to Phosphorus Ratio: High intakes of phosphorus may bind calcium in the gut and limit the amount of calcium being absorbed. The National Academy of Sciences recommends a calcium/phosphorus ratio of 1:1. However, evidence indicates that humans may be able to tolerate wide ranges in the Ca:P ratio (from 2:1–1:3). More study is needed to establish the ideal Ca:P ratio.

Some investigators have suggested that excess phosphorus (obtained primarily from drinking milk) prevents calcium absorption, and may be responsible for leg cramps common between the 24-36th weeks of pregnancy. Decreased milk, the use of calcium salts free of phosphates, and aluminum hydroxide (to bind phosphorus in the gut) seemed to relieve these cramps (9). However, the same results have not been repeated in later studies (10). Some obstetricians may still recommend decreased milk intake for leg cramps, although no evidence currently indicates such treatment is beneficial. More research may uncover other factors responsible for leg cramps.

As milk is a good source of calcium, protein and vitamin D, it should be included in the diet. With regard to excessive dietary consumption of phosphorus from soft drinks, there is no longer concern about the phosphorus content of certain soft drinks, namely colas and root beer, which had contributed excessive amounts (500 mg/12 oz.) of phosphorus to the diets of pregnant women consuming large volumes of them (11). Currently, the phosphorus content of these beverages is low (approximately 5–75 mg/12 oz.) presumably due to formulation changes involving reduction of phosphoric acid (12,13). For the woman with aggravated leg cramps, there are exercises and recommended foot positions to help.

Dietary Intake of Protein: Increased intake of protein may increase urinary calcium excretion. Studies using purified proteins show increased calcium excretion with protein intakes within ranges normally consumed in the U.S. However, when meat was used, calcium excretion did not significantly increase (3). More research is needed in this area.

Vitamin D: See section on vitamin D for information about relationship between calcium and vitamin D.

Calcium Supplements

The necessity of calcium supplements during pregnancy is controversial. In special situations – for example, confirmed lactose intolerant women or strict vegans (vegetarians who do not consume dairy products or eggs) – supplements may be advisable. Some professionals suggest calcium supplements as a safety measure in normal pregnancies. Most practitioners feel they are unnecessary on a routine basis. Many prenatal vitamin/mineral supplements contain 100–300 mg calcium per tablet.

Other sources of calcium for women who are lactose intolerant or who do not drink milk include Lactaid (a lactose-free, low-fat milk) and Calcimilk (lactose-free and low-fat, fortified with calcium).

THIAMIN, RIBOFLAVIN, NIACIN

The B vitamins are necessary co-enzymes in energy metabolism. Requirements for these vitamins increase with an increase in caloric intakes. Since pregnancy requires increased energy, the need for thiamin, riboflavin and niacin increases as well. The RDA for thiamin is 1.4–1.5 mg (an additional 0.4 mg); for riboflavin the RDA is 1.5–1.6 mg (an additional 0.3 mg); and for niacin the RDA is 15–16 mg NE (an additional 2 mg niacin equivalent [NE]).

All three vitamins can be found in a wide variety of foods. Legumes, organ meats and pork are rich in

thiamin. Riboflavin is abundant in milk, cheese, lean meats and leafy green vegetables. Since niacin can be formed in the body from tryptophan, protein of high biologic value is also a good source of niacin. Whole and enriched grains and their products (breads, pasta, etc.) are good sources of all three vitamins. Most commercial breads are made with enriched flour. However, other baked goods and bread made in local bakeries may be made with non-enriched flour.

PYRIDOXINE

Pyridoxine (vitamin B_6) acts as a co-enzyme in several reactions of protein and amino acid metabolism. B_6 is also necessary for the conversion of tryptophan to niacin. As protein intake increases, so does the need for B_6.

The RDA during pregnancy is an additional 0.6 mg/day for a total of 2.6 mg/day. The extra protein required by pregnancy necessitates this increase in B_6. Meat, fish and poultry are good sources of pyridoxine. Whole grains and cereals are also good sources, but the vitamin is removed during processing and not replaced during the enrichment process. Other sources of pyridoxine include greens, potatoes, bananas, avocados, dried fruits, legumes and nuts.

COBALAMIN (B_{12})

Cobalamin is required for the synthesis of nucleic acids. The RDA for B_{12} is an additional 1 mcg per day (for a total of 4 mcg/day) to account for fetal needs and the metabolic demands of the mother. B_{12} is found only in foods of animal origin. A dietary deficiency resulting in megaloblastic anemia is rare except in women on vegan diets (containing no animal products); they need B_{12} supplements.

(For additional information, see **Vegetarian Prenatal Diet** and **Anemias of Pregnancy.**)

FOLACIN*

The need for folacin increases during pregnancy because it is necessary for the synthesis of DNA and RNA which are required to make new cells. Folacin takes carbon fragments and transfers them to purine and pyrimidine rings, of which DNA and RNA are made. Folacin also acts as a co-enzyme in the synthesis of glycine which donates carbon and nitrogen to purines and pyrimidines.

If folacin is lacking, cell division is adversely affected. Folate deficiency is most detrimental in cells with a high turnover rate, such as red blood cells. During pregnancy, when red cell volume increases 20% or more, folacin is especially important. A deficiency of folacin can lead to megaloblastic anemia. Very low intakes may also cause fetal malformations, placenta abruptio and spontaneous abortion.

In order to protect women from the possible consequences of folacin deficiency, the RDA for folacin during pregnancy is 800 mcg, twice the non-pregnant amount. Folacin may be obtained from leafy green vegetables, legumes, nuts, and whole grains. Cooking vegetables destroys about 80% of the folacin. Folacin is also destroyed during refinement of grains and not replaced during enrichment. In order to preserve the folacin content of foods, vegetables should be eaten raw or only slightly cooked. Whole grain breads and cereals should be chosen.

Because of the dangers of tolacin deficiency and the problems of obtaining adequate folacin due to cooking and processing methods, supplements of 200-400 mcg are usually recommended during pregnancy. The majority of prescription prenatal vitamins contain 1 mg of folacin. (See **Anemias of Pregnancy** for more information.)

Both B_{12} and folate deficiency result in megaloblastic anemia. If B_{12} deficiency is treated with folate supplementation, the megaloblastic anemia will temporarily improve. Therefore the B_{12} deficiency will remain undetected until neurological symptoms develop. Since the incidence of B_{12} deficiency is very low, this masking effect should not be a reason for withholding folate. However, all women should be questioned to make sure they are obtaining adequate B_{12}.

ASCORBIC ACID

Ascorbic acid is vital for collagen formation and the integrity of connective vascular tissue in mother and fetus. It also enhances iron absorption in the mother. Vitamin C deficiency is associated with impaired wound healing and lowered resistance to infection.

The RDA for vitamin C is an additional 20 mg/day for a total of 80 mg/day. Excellent sources include citrus fruits, broccoli, cantaloupe, strawberries and green or red peppers. Other good sources are cabbage, potatoes, greens, cauliflower, Brussels sprouts, sweet potatoes and tomatoes. Vitamin C is destroyed by heat and exposure to air. In order to preserve the vitamin content, foods containing vitamin C should be eaten fresh raw, steamed, or cooked for a short time in small amounts of water.

(See section on **Nutritional Supplements** for risks of excessively high dosages.)

*Folacin and folate are both used to describe compounds having nutritional properties and chemical structure similar to folic acid (pteroylglutamic acid) (3).

VITAMIN A

Vitamin A is necessary for the integrity of epithelial tissue – skin and membranes that line glandless ducts and GI, urinary and respiratory tracts. Vitamin A is also required for formation of visual purple for dim light vision and for toothbud formation (enamel forming cells). Vitamin A is stored in the developing fetus.

The recommended daily intake is 1000 mcg retinol equivalents, an additional 200 mcg retinol equivalents (RE) per day, increased 25% over the non-pregnant state to compensate for fetal storage. A pregnant woman can obtain adequate vitamin A from 1-2 daily servings of yellow fruits and vegetables. Most skim and low-fat milk is fortified with vitamin A. Skim and low-fat milk contain about 10% of the RDA for pregnant women per cup; whole milk contains about 4% of the RDA for pregnant women per cup.

(See section on **Nutritional Supplements** for risks of excessively high dosages.)

VITAMIN D

Vitamin D is essential for the absorption of calcium. Irreversible deformities of the fetus may occur without sufficient amounts of vitamin D during pregnancy. At very low intakes of vitamin D during the last trimester, a newborn may be hypocalcemic, leading to neonatal tetany (14).

The RDA for pregnant women for vitamin D is 10–15 mcg, an additional 5 mcg over non-pregnant levels. Vitamin D can be obtained by exposure of skin to sunlight or by eating foods fortified with vitamin D. All milk is fortified with vitamin D, and some margarines contain 15% of the RDA for pregnant women per tablespoon. Individuals who obtain enough vitamin D seem to tolerate wide variations in the Ca:P ratio.

(See section on **Nutritional Supplements** for risks of excessively high dosages.)

VITAMIN E

Vitamin E acts as an antioxidant, protecting the polyunsaturated fats (PUFA) in cell membranes. As the dietary intake of PUFA increases, so does the need for vitamin E. Vitamin E also protects vitamin A from oxidation in the gut.

The RDA during pregnancy is 10 mg atocopherol, an additional 2 mg atocopherol equivalents over non-pregnant requirements to allow for fetal storage. The additional calories required during pregnancy should provide sufficient additional vitamin E.

At present there is no conclusive evidence of a relationship between vitamin E deficiency and reproductive casualties or spontaneous abortion.

TRACE ELEMENTS

Many trace elements are needed for chemical reactions in the body. Limited information exists on the adult requirements for most of them. RDA's are established for only a few trace elements.

There has been concern that many people do not obtain adequate trace elements because they consume highly refined and processed foods from which many trace elements have been removed. Selecting a nutritionally adequate diet primarily from unprocessed or lightly processed foods is a good way to help insure an adequate intake of trace elements.

Zinc: Zinc-containing enzymes are involved in the synthesis of DNA and RNA. In addition, zinc is involved in most metabolic pathways in the body, and is a component of insulin. Marginal zinc deficiency may appear in some segments of the U.S. population.

The RDA for pregnancy is increased by 5 mg to 20 mg to allow for the growth of the fetus and placenta. There is a progressive decline in plasma zinc concentration in pregnancy, which is thought to be physiologic and not indicative of deficiency. However, dietary intake in both middle and low-income pregnant women in this country averages less than two-thirds of the RDA (15).

In animals, maternal zinc deficiency will produce fetal malformations in a short time. This evidence suggests that zinc stored in bones is not readily available, and that daily intake may be necessary for adequate growth and development (8).

Some human studies indicate that maternal zinc deficiency produces similar adverse effects (15). A Swedish study showed an association between low maternal serum zinc concentrations and congenital malformations and obstetrical complications, in addition to such problems as maternal impaired taste, food cravings and pica (16).

Zinc deficiency may be involved in the growth retardation seen in the fetal alcohol syndrome (17). Excessive alcohol intakes causes increased urinary losses of zinc, and the diets of heavy drinkers are known to be poor.

Routine zinc supplementation in pregnancy may be advocated in the future if more reports like the Swedish study are forthcoming. However, the fact that iron impairs zinc absorption and is, of course, recommended to all pregnant women, must be reckoned with (18). In addition, there is some indication that zinc supplementation to the level of the RDA does not appreciably alter plasma zinc (19). Many prenatal supplements already contain zinc.

Zinc can be obtained from meat, liver, eggs and seafood. Milk is a fair source. However, zinc is less readily available from plant sources, probably because phytate and fiber prevent absorption.

Therefore, women on strict vegetarian diets may have a considerably higher dietary zinc requirement.

Iodine: Iodine is necessary for the functioning of the thyroid hormones. The RDA for iodine is 175 mcg, an increase of 25 mcg daily to allow for fetal demands. Iodine is obtained mainly from seafood and from iodized salt. Many processed foods also contain iodine.

Magnesium: Magnesium is essential in most enzyme systems and maintains the electric potential in nerve and muscle membranes. Limited information is available on magnesium requirements in pregnancy; the RDA is set at 450 mg/day, an additional 150 mg over non-pregnant requirements. Magnesium occurs widely in food, especially green vegetables, wheat germ and bran, nuts and soybeans.

Other trace elements include copper, manganese, cobalt, molybdenum, fluoride, chromium, selenium, nickel, vanadium, silicon, tin, arsenic and cadmium. Safe ranges of daily intake have been established for copper, manganese, fluoride, chromium, selenium and molybdenum based on limited information. Ranges for pregnant women have not been determined.

NUTRITIONAL SUPPLEMENTS

The necessity of vitamin/mineral supplements during pregnancy is controversial. Since maternal levels of most water-soluble vitamins and some other nutrients (eg. iron, glucose, calcium) are lower than non-pregnant levels, health practitioners have recommended supplements to bring vitamin levels to non-pregnant standards.

Although nutrient requirements do increase during pregnancy, dietary deficiency does not adequately explain these drops in nutrient levels since they occur consistently among large populations of women with normal pregnancies delivering healthy babies. In fact, evidence now suggests that the decreases in maternal nutrient levels may be physiologic. The dilutional effect of expanded blood volume can explain many of the decreases. (*Total* circulating levels of many nutrients increase during pregnancy.) Other physiologic adjustments of pregnancy may be responsible for the decreases in other nutrients. Some investigators have suggested that low maternal nutrient levels may favor transfer to the fetus by some unknown mechanism (11). Many of the drops cannot be explained at present.

The fetus does not appear to suffer from lowered maternal levels of vitamins. Although thiamin, riboflavin, ascorbic acid, B_6, B_{12}, and folacin decrease in the mother during pregnancy, fetal levels are as much as two to three times greater. Fat soluble vitamins tend to rise slightly or remain the same in the mother; fetal levels generally reflect maternal changes (except vitamin E; fetal levels do not reflect large maternal increases.)

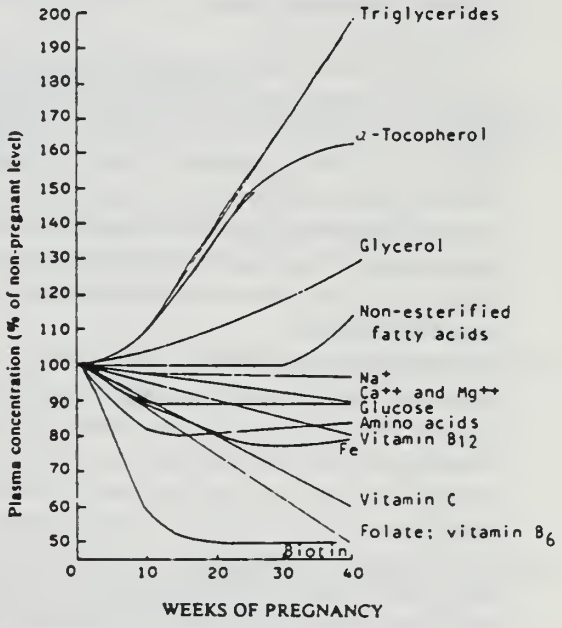
For these reasons, vitamin/mineral supplements may not be necessary during pregnancy. However, since they have become a routine part of prenatal care, many women may want to take them. For women with obviously deficient diets, they are well-advised. In all cases, supplements should not be considered a substitute for a wholesome balanced diet.

The two nutrients most often recommended for supplementation are iron and folacin. The additional need for these nutrients during pregnancy is well established and adequate amounts are often difficult to obtain from usual dietary sources. Iron deficiency or megaloblastic anemia respectively may result from low levels of these nutrients.

The recommendation for iron supplementation is 30–60 mg elemental iron daily (in the form of ferrous sulfate or ferrous gluconate). Most prenatal vitamin/mineral supplements contain this amount of iron.

The RDA for folacin is 800 mcg. The majority of prescription prenatal vitamin/mineral supplements contain 1 mg of folacin.

Fig. 1-4. Changes in pregnancy of the plasma concentration of some nutrients. The levels shown in this figure are percentages of the non-pregnant level taken as 100%.



(This illustration is reproduced from Postgraduate Medical Journal vol. 55, page 300, 1979 by kind permission of the editor.)

Excessive Dosage

Vitamins A, D, and K in excessive doses may be harmful to fetal development. Relatively little is known about the method of transport across the

placenta; these vitamins circulate at about the same levels in maternal and fetal blood. This evidence indicates that high levels in the mother may be reflected in the fetus.

Vitamin A should not be ingested in excess of 7500 RE daily (3). High doses of vitamin A administered to laboratory animals have produced cleft palate and other facial abnormalities in offspring. In addition, high levels of vitamin A in the liver of some malformed fetuses indicates a possible teratogenic effect (21).

Excess amounts of vitamin D may have a toxic effect on the fetus. Aortic stenosis has been noted in the offspring of rabbits given high doses of vitamin D during pregnancy. Excess vitamin D has also been associated with hypercalcemia, mental retardation, hypertension, and elfin faces (21). Although more research is needed, pregnant women should consume close to the RDA for vitamin D (3). The RDA for vitamin D will be exceeded by a factor of 300% by women who consume on a daily basis a quart of milk, a serving of a breakfast cereal which contains 100% of the USRDA for the vitamin and a prenatal vitamin/mineral supplement. (Note that for vitamin D, 100% of the USRDA is equivalent to the amount which meets 100% of the RDA for pregnant women.)

Vitamin K in large doses before delivery (15 mg or more) may cause significant fetal complications of hyperbilirubinemia, jaundice, kernicterus and hemolytic anemia (20).

The ingestion of megadoses of ascorbic acid (over 1 gm daily) to prevent a cold has become rather common. Infants of mothers who took megadoses of ascorbic acid during pregnancy have developed signs of scurvy, presumably due to a resulting dependence on high doses. Although more research is needed, pregnant women should be cautioned about the effects of large doses and discouraged from excessive ingestion (8,20).

In the past it had been hypothesized that excessive intake of vitamin B_6 during pregnancy caused pyridoxine dependency in the newborn. Further investigation did not bear this out, and it is now thought that pyridoxine dependency represents an inborn error of pyridoxine, not an acquired dependency (22). Pregnant women should avoid taking large amounts of supplemental pyridoxine which may be recommended to them as an anti-nauseant. The effectiveness of pyridoxine in the control of pregnancy nausea has not been adequately demonstrated.

Some investigators believe taking megadoses of vitamins introduces another possible source of toxicity besides the vitamins themselves. The Food and Drug Administration allows synthetic vitamins to contain up to 2% impurity, if the impurity factor proves to be non-toxic at physiologic doses. When megadoses are taken, the potential amount of contaminants consumed may exceed the demonstrated non-toxic level. This provides yet another argument against the use of megadoses of vitamins, especially in pregnancy, a period of high biological vulnerability.

No vitamin/mineral supplements should be taken in doses above the RDA without consulting a physician.

In 1977, the Food and Drug Administration ruled that nutritional supplements for pregnant women provide between 50% and 150% of the USRDA for ten vitamins and five minerals. In the appendix is a listing of all prenatal vitamin and mineral supplements, both over-the-counter and prescription.

This food guide provides working information for health practitioners. It is not necessarily appropriate to use "as is" in counseling. Many food guides are available for patient education. They are listed in the resource guide. Items starred (*) are good sources of folic acid.

PROTEIN FOODS

Serving size: 2-3 ounces, except when indicated.

How much: 2-3 servings daily provide 14-21 gm protein per serving. Additional protein can be obtained from dairy products and grains.

Meat

beef, lamb, pork
ham
liver*
organ meats
rabbit
(Hot dogs, cold cuts, sausage, spare ribs and bacon are not included because of their high fat content.)

Seafood

fish
sardines
tunafish ½ cup
crab, lobster, scallops, shrimp
clams
oysters 8-12

Vegetable protein

canned baked beans*	1 cup
dried peas/beans (cooked)*	1 cup
peanut butter	¼ cup
nuts	½ cup
seeds	½ cup
tofu	1 cup

Eggs 2

Poultry

chicken, turkey

DAIRY PRODUCTS

Serving size: 1 cup, except when indicated.

How much: 3-4 servings daily. One serving provides 8 gm protein and approximately 300 mg calcium.

milk: whole, lowfat, skim, powdered, buttermilk, chocolate

yogurt	
cheese	1½ oz.; two 1" cubes
cottage cheese	¼ c. (provides only 45 mg calcium)
pudding/custard	
soups made with milk	1½ cups

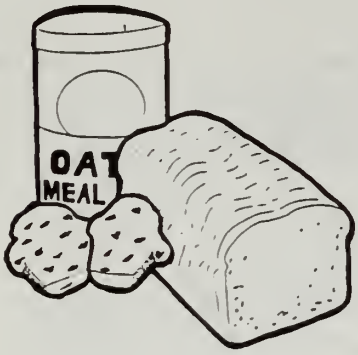
BREADS AND CEREALS

Serving size: varies

How much: 4 servings daily provides carbohydrate, fiber, B vitamins, iron. An average serving provides 2 grams protein.

Whole grain*

bread: cracked, whole wheat, rye	1 slice
cereal: hot - oatmeal, cracked wheat, rolled wheat	½ cup
ready-to-eat	¾ cup
wheat germ	1 T.
brown rice	½ cup cooked



Enriched

bread	1 slice
pasta-cooked	½ cup
white rice	½ cup
hot cereal: cream of wheat, rice, farina, cornmeal	½ cup
pancakes, waffles	1 medium
crackers	4
biscuit/muffin	1
tortilla	1
ready-to-eat cereal	¾ cup

Read labels to determine if ready-to-eat cereal is whole grain and low in sugar.

Whole wheat pasta is often available.

FRUITS AND VEGETABLES

Serving size: varies

How much: 3-4 servings including 1-2 servings vitamin C-rich, 1 serving vitamin A-rich. A serving of vegetables provides an average of 2 gm protein.

Vitamin C sources (average 70 mg. vitamin C)

Fruits		Vegetables	
orange*	1 whole	broccoli*	½ cup
grapefruit	½	green pepper	½ medium
strawberries	¾ cup	cauliflower	1 cup
cantaloupe	1 medium	cabbage*	¾ cup
guava	1	tomato	1 large
mango	1	Brussels sprouts	5 medium
orange juice*	½ cup	spinach	½ cup
grapefruit juice*	¾ cup		
tomato juice*	1 cup		

Vitamin A sources

Fruits		Vegetables	
apricots	2-3	broccoli	1 stalk
cantaloupe*	¼	carrots	⅔ cup
watermelon	1 slice	sweet potato	1 small
papaya	⅓	winter squash*	½ cup baked
		spinach*	½ cup
		pumpkin	½ cup
		romaine*	3½ ounces
		mustard, collard greens*	½ cup

ADDITIONAL FRUITS AND VEGETABLES OF CHOICE

Vegetables

artichoke	corn	potato
asparagus*	cucumber	radishes
avocado*	eggplant	summer squash
bamboo shoots	mushrooms	turnips
beans	onion	zucchini
beets*	parsnip	
celery	peas*, pea pods	

Fruits

apples	peach
banana	pear
berries	persimmon
cherries	pineapple
dates, figs	plums
grapes	prunes
nectarine	raisins

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VEGETARIAN PRENATAL DIET

2

Many vegetarian diets promote adequate growth of the fetus and sustain the mother. With sufficient calories and specific supplementation, many regimes can be an alternative to a meat-based diet. Other diets restricting one or more nutrients (weight loss or fad diets for example) should be discouraged for a prenatal woman.

Vegetarian diets are usually lower in calories and cholesterol and higher in water and fiber than diets containing meat. They usually have a higher P:S ratio as well. The amount of polyunsaturated fats in proportion to the amount of saturated fats is expressed as the P:S ratio. During pregnancy a vegetarian must take care to consume adequate protein for fetal and maternal needs. Lacto-ovo diets can easily meet the protein needs of pregnant women. Vegan diets provide enough protein if a variety of plant protein is combined correctly. Both lacto-ovo and vegan diets must also supply adequate calories so that protein is not used for maternal energy needs and to insure adequate weight gain.

Table 2-1. ADEQUATE VEGETARIAN DIETS

Type of Vegetarian Diet	Food Included	Supplements Needed
Lacto - ovo + (no red meat)	Vegetable, fruits, nuts grain, legumes, milk, poultry, fish.	Iron Folic acid
Lacto - ovo	Vegetables, fruit, nuts, grain, legumes, milk, milk products, eggs	Iron Folic acid
Vegan	Vegetables, fruit, nuts, grain, legumes	B12 Calcium Iron Folic Acid

Table 2-2. INADEQUATE VEGETARIAN DIETS

Type of Vegetarian Diet	Food Included	Supplements Needed
Fruitarian	raw or dried fruit, nuts, honey, oil	protein, calories, vitamins A, D, B_{12}, folacin, calcium, phosphorus, iodine, iron.
Macrobiotic	10 sequential diets lowest - cereals, fruits, vegetables, some animal products highest - brown rice avoidance of liquid on all diets	protein, calories, vitamins A, D, B_{12}, E, C, folacin, calcium, riboflavin, B6, phosphorus, iodine, iron

Guidelines for a Vegetarian Diet

- Encourage a wide variety of foods and try to include milk and eggs in the diet.
- If no dairy products are consumed, a supplement of 4 mcg/day of vitamin B_{12} should be prescribed. A supplement of calcium and vitamin D is also recommended.
- Try to suggest ways of making complementary protein dishes.
- Suggest use of iodized salt.
- Watch pattern of weight gain, as vegetarian diets tend to be categorically dilute. Underweight vegetarians may need considerable support to gain the greater number (30) of pounds recommended for underweight women.

Lacto-ovo vegetarians: The following food guide meets the nutrient needs of pregnancy for a woman consuming a lacto-ovo diet.

Table 2-3. FOODS FOR BASIC NUTRIENT NEEDS IN PREGNANCY FOR A LACTO-OVO VEGETARIAN WOMAN

Foods	Nutrients Provided	Recommended Daily Servings
Vegetables	Vitamin A Folic Acid Riboflavin Vitamin C Calcium	3 +, including 1 dark, leafy
Fruit	Vitamin A Vitamin C Carbohydrate (CHO)	1 - 4, including 1 high in Vitamin C
Milk, Eggs	Protein Vitamin B_{12} Riboflavin Calcium Fat Carbohydrate	4 + (whole or skim) and 1 egg
Grains, Seeds Nuts, Legumes	Protein CHO Thiamin Niacin Vitamin B_6 Folic Acid Fiber Fat	6 +, including 1 whole grain bread and 1 serving beans

Vegans: For a vegan, adequate protein can come from a carefully planned diet of 60% of calories from grains, 35% of calories from legumes, and 5% of calories from green leafy vegetables. The four food groups become vegetables, fruits, grains, and legumes. The use of margarine and vegetable oils should be encouraged to provide calories.

Protein combining: Eight of the 21 amino acids that make up protein in adults are essential. The human body cannot manufacture these amino acids and therefore they must be obtained from the diet. A vegetarian who does not consume dairy products or eggs (which contain all eight amino acids) must learn to combine plant proteins (which individually do not contain all 8 essential amino acids in adequate amounts) in order to assure adequate intake of the essential amino acids. Tables 2-4, 2-5, 2-6, and 2-7 provide additional information to be used in protein combining.

Table 2-4. COMMON COMBINATIONS FOR ADEQUATELY BALANCED PROTEIN INTAKE

Plant Combinations
- bread and peanut butter
- rice and beans
- sunflower seeds and peanuts
- tofu (soybean curd) and rice
- hummus (sesame seeds and chick peas)
- baked beans and brown bread (whole wheat flour and molasses)
- pasta e fagioli (wheat and kidney beans)
- bean taco (corn and beans)

Plant/Animal Combinations
- macaroni and cheese
- cereal and milk
- rice pudding
- quiche
- cheese and crackers
- manicotti, ravioli and spaghetti
- pizza

Table 2-5. PROTEIN COMBINATIONS - GRAMS USABLE PROTEIN

FOOD	GRAMS PROTEIN
2 c. rice and 1/2 c. beans	15 gm
2 1/2 c. rice and 2 oz. tofu	12 gm
1 c. rice and 1 c. milk	10 gm
6-7 tortillas and 1/2 c. beans	14 gm
2 slices whole wheat bread and 2 Tbs. peanut butter	5.5 gm
1 medium potato and 1 c. milk	9 gm
1 c. macaroni and 2 oz. cheddar cheese	13 gm
2 Tbs. peanuts and 3 Tbs. sunflower seeds	7 gm

Adapted from: Ewald, Ellen: **Recipes for a Small Planet**. N.Y., Ballantine Books, 1973 and Lappé, Frances Moore: **Diet for a Small Planet**. N.Y., Ballantine Books, 1971.

Table 2-6. COMPLEMENTARY PLANT PROTEIN SOURCES

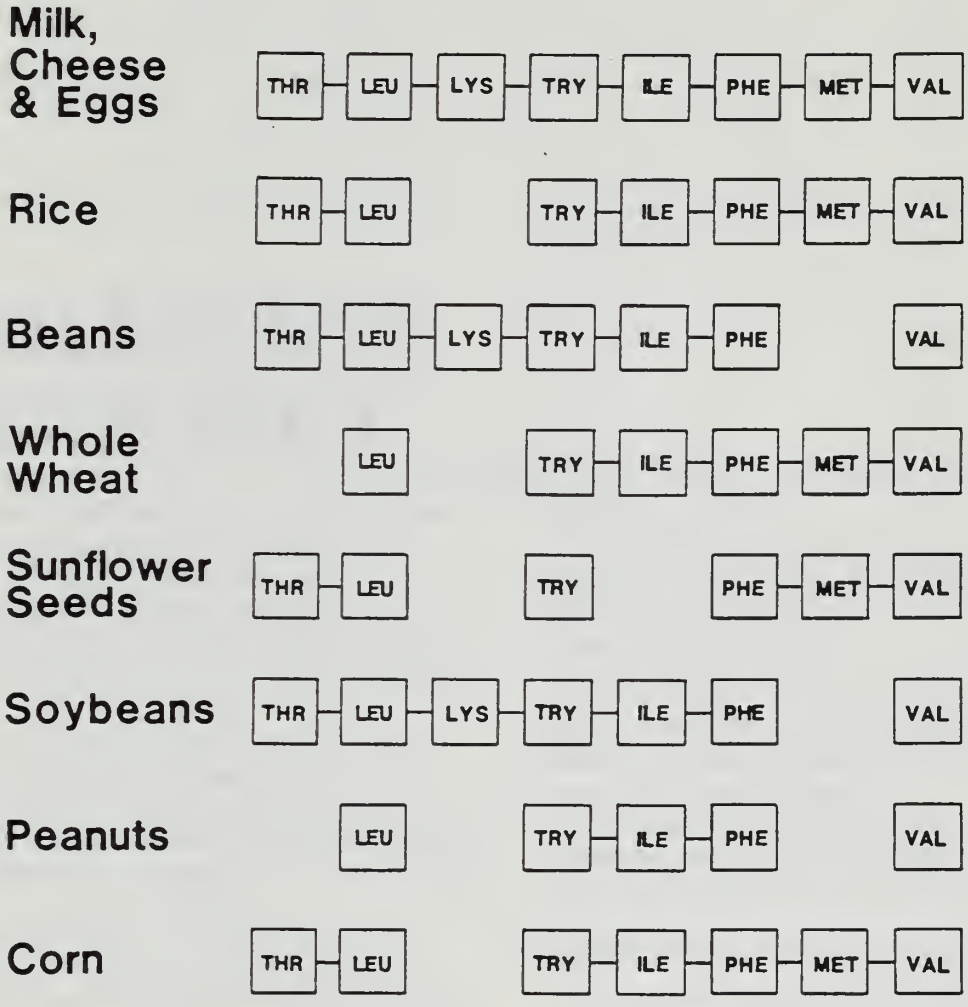
Food	Amino Acids Deficient	Complementary Protein
Grains	Isoleucine Lysine	Rice + legumes Corn + legumes Wheat + legumes Wheat + peanut + milk Wheat + sesame + soybean Rice + sesame Rice + Brewer's yeast
Legumes	Tryptophan Methionine	Legumes + rice Beans + wheat Beans + corn Soybeans + rice + wheat Soybeans + corn + milk Soybeans + wheat + sesame Soybeans + peanuts + sesame Soybeans + peanuts + wheat + rice Soybeans + sesame + wheat
Nuts and Seeds	Isoleucine Lysine	Peanuts + sesame + soybeans Sesame + beans Sesame + soybeans + wheat Peanuts + sunflower seeds
Vegetables	Isoleucine Methionine	Lima beans Green peas Brussels sprouts Cauliflower Broccoli (+ sesame seeds or Brazil nuts or mushrooms) Greens + millet or converted rice

Adapted from: Lappé, Frances Moore: **Diet for a Small Planet**. N.Y.: Ballantine Books, 1971.

The following chart may be helpful in counseling vegetarians on protein complementing.

Figure 2-1. COMBINING AMINO ACIDS FOR COMPLETE PROTEIN

THE BUILDING BLOCKS OF COMPLETE PROTEINS


Milk, Cheese & Eggs
THR LEU LYS TRY ILE PHE MET VAL
Rice
THR LEU TRY ILE PHE MET VAL
Beans
THR LEU LYS TRY ILE PHE VAL
Whole Wheat
LEU TRY ILE PHE MET VAL
Sunflower Seeds
THR LEU TRY PHE MET VAL
Soybeans
THR LEU LYS TRY ILE PHE VAL
Peanuts
LEU TRY ILE PHE VAL
Corn
THR LEU TRY ILE PHE MET VAL

- Jack Vondras

ADOLESCENT PREGNANCY

3

While birth rates in the general population have decreased, adolescent pregnancies are increasing. Nearly one in five births is to a teen-ager. In addition, births to very young teens (10-14 years) have nearly doubled in the past twenty years (1). One quarter of teen-agers have a second baby within one year (2).

To counsel adolescents effectively, an understanding of the physical and emotional changes occuring during these years is necessary. The eating patterns and special nutritional requirements of teen-agers should also be understood to help these young women have healthy pregnancies.

Adolescence is a time of many physical, physiological and psycho-social changes. Both sexual maturity and linear growth are achieved at this time.

PHYSICAL CHANGES

From ages 9-17 years, 50% of adult weight and 10-15% of adult stature is achieved (2). This considerable growth is achieved in two distinct periods, pubescence and adolescence.

Pubescence (9–13 years) is the peak period for linear growth and sexual maturity for girls. The primary growth spurt occurs between 12-13 years (before the onset of menstruation). The increased levels of estrogens present after menarche promote the closing of the epiphyses (the growth points at the end of the bones) (3).

The ability to reproduce occurs at about 13 years, although there is wide variation among individuals. The median age for onset of menstruation in the United States is 12.8 years.

Adolescence (13-17 years) is a time of further linear growth, but at a decelerated rate (for girls). Linear growth usually tapers off by four years after the onset of menstruation (4).

Body composition changes occur during both pubescence and adolescence. Females develop wider hips and more fat stores, as compared with males.

Implications for Pregnancy

The two years after the onset of menstruation are the most critical time for pregnancy. Very young adolescents (14 years or less) are at the greatest risk for delivering low birth weight infants (2). A statistically significant increase in low birth weight (LBW) infants (2500 gm or less at birth) was found in mothers delivering at a gynecological age (chronological age minus age at menarche) of two years or less (5).

Older teens (over 15 years) have completed a large part of their growth spurt. Although they are at less physiological risk, psycho-social concerns and poor nutrition habits may create problems for them as well.

The age at which the major growth spurt takes place is subject to variation. A girl who enters pregnancy before her growth spurt would be more at risk. This can be determined if the girl has had regular well-child check-ups with height and weight recorded on a growth chart.

Weight gain averages between 11-12 lbs between the onset of menstruation and maturity. Rapid gain usually occurs the first year after the onset of menstruation and then tapers off (2). One investigator has plotted normal adolescent weight gain year by year (6):

Postmenarcheal Year	Pounds	Kilograms
1	10.12	4.6
2	6.16	2.8
3	2.42	1.1
4 and 5	1.76	0.8

This normal yearly weight increase must be considered when recommending total weight gain during adolescent pregnancy. Specifically, the expected weight gain for gynecologic age during the year of the pregnancy is added to the amount recommended for the general population, namely 24-30 lbs.

For example, a pregnant 16 year old who menstruated first at 14 has a gynecologic age of 2 years. Approximately 6 lbs should be added to the 24-30 lbs weight gain recommended to older women, for a total expected gain of 30-36 lbs. In another example, a late-maturing 16 year old who began menstruating at age 15 should gain an additional 10 lbs in pregnancy. Attaining recommended levels of weight gain may be especially important in cases of delayed menarche because of the possibility that poor nutrition is a contributing factor.

When only age is considered in making weight gain recommendations for young adolescents (ages 13-15 years), a recent study suggests that this group gain at least 4 kg or 8.8 lbs more than older women to help ensure adequate birth weight of their infants (7). This figure is in agreement with data previously cited regarding normal adolescent weight gain in the first years following menarche.

Preliminary studies of actual weight gain in adolescent pregnancy show that adolescents do in fact gain more weight than older pregnant women (8). In 80 girls ages 13-17 years, the average weight gain was 37 lbs, and 9% gained less than 21 lbs. Younger girls and girls of low gynecologic age tended to gain less than older girls and girls of greater physical maturity. Underweight girls had the largest gains.

This study indicates the need for a separate set of standard prenatal weight gain curves for adolescents which takes into account such factors as chronologic age, gynecologic age and prepregnancy weight-for-height. At present, the assessment of the adolescent girl as overweight, underweight or normal weight remains problematic and no generally accepted standard exists (6).

The following groups of adolescents need special encouragement to gain adequate weight in pregnancy: girls under age 15, girls within 2 years of menarche, girls with late onset of menses, the underweight and multiparas. These factors indicate increased nutrient needs due to rapid growth or poor nutrient stores.

It should be noted that in considering postpartum weight loss in young adolescents, prepregnancy weight will not be attained because of the yearly growth factor expected following menarche.

PSYCHO-SOCIAL CHANGES

Adolescents begin to identify more with their peers and seek independence from their families. They need to feel they can make their own decisions. Use of drugs and alcohol and early sexual contact are, in part, ways of demonstrating both independence and peer group solidarity.

Physical changes make teens (both boys and girls) acutely aware of their own bodies. Girls may feel their bodies do not measure up to ideals projected through the mass media. Their confidence and self image may suffer from these feelings of inadequacy. They may undereat or try a variety of fad diets in an effort to make their bodies conform to an image of beauty. They may overeat in despair or self-hate if they feel inadequate or unaccepted. During pregnancy, they may be excessively worried about gaining weight.

Teens may be poorly prepared for pregnancy since they are still struggling with their own identities. Family support systems may be non-existent; there is a greater incidence of child abuse among these young parents. In addition, high school drop-out rates are high; low-paying jobs and unemployment are common. For married teens the divorce rate is high.

All these factors make the adjustment to pregnancy and parenthood difficult for many teenagers. However, most want to take care of themselves and their babies in the best way they can. They are often anxious to learn more about how to do this.

DIETARY CONCERNS

1. Teenagers frequently skip meals, expecially breakfast or lunch. Frequent snacking often replaces regular meals.

2. Snacks tend to be primarily foods of low nutrient density - soda, chips, cookies, other foods high in fat, salt and sugar.

3. Fast food restaurants and sub shops are favorite hang-outs of teen-agers, where they can be

with their friends and demonstrate some independence from their parents. Food sold at these spots is often of low nutritional quality. A study found that the meal most frequently eaten out comprises coke, french fries and a sandwich (9).

4. About one-quarter of the energy teen-agers consume comes from high-calorie, low nutrient density foods. At the same time, total energy intakes appear to be below recommended levels (10). Therefore, the chance of obtaining adequate nutrients is slim for many adolescents.

5. Concern with body image may lead to under-eating, overeating and/or fad dieting. Anywhere between 3-15% of teens are obese. Anorexia nervosa has become a significant problem.

6. The use of alcohol and/or drugs may seriously affect dietary intake and nutritional status. Smoking may affect fetal outcome.

7. As a result of these eating patterns, certain deficiences can result. Generally, adolescent diets are low in dairy products, fruits and vegetables. A teen-ager may have low nutritional stores - particularly iron, zinc and calcium, and vitamins A, C, B_6 and folacin (11).

While these eating patterns are of concern for all teen-agers, they create special problems for the pregnant adolescent, who especially needs a high quality diet.

NUTRIENT NEEDS OF PREGNANT ADOLESCENTS

Energy: An adequate intake of kilocalories is necessary. Energy needs can vary from 38-50 kcal per kg or 1800-3000 kcal daily, depending on age. For the first two years after menarche, growth needs should be considered when determining caloric requirements. The best indication of an adequate intake is sufficient weight gain (12).

Protein: A higher recommendation for pregnant adolescents is necessary to allow for their own needs. Two methods of determining protein requirements (12,13) are shown in Table 3-1.

Table 3-1. ADOLESCENT PROTEIN REQUIREMENTS

	Age	Protein
1.	15-18 yrs.	1.5 gm/kg pregnant body weight
	younger girls (<15 yrs.)	1.7 gm/kg pregnant body weight
2.	15-18 yrs.	0.9 gm/kg non-pregnant body weight
	11-14 yrs.	1.0 gm/kg non-pregnant body weight (Plus 30 gm extra protein daily - the pregnancy requirement)

Adequate carbohydrate and fat must be supplied by the diet so that protein is not used for maternal energy.

Calcium: The need may be as high as 1600 mg during the growth spurt. If growth has tapered off by pregnancy, 1200 mg is sufficient.

Iron: Iron deficiency anemia is prevalent among adolescents. Many will enter pregnancy with low iron stores. A supplement of 30-60 mg is recommended, as with all pregnant women (4).

Zinc: This mineral is essential for growth. Twenty mg daily is recommended. Highly processed foods or diets low in protein can be deficient in zinc (14).

Vitamins A, B_6, C and folacin are often consumed in insufficient amounts. A 200-400 mcg folic acid supplement is recommended (13). Adequate intake of the other vitamins should be advised.

COUNSELING

1. Offer to explain the importance of an adequate diet and appropriate weight gain. Do not lecture or be judgmental. Most teenagers want to do what is best for their babies.

2. Use pictures, models, charts, posters and films. Teen-agers are often very interested in fetal development. Pictures can make the idea of a baby real and help them want to take care of the baby before birth.

3. Adapt nutrition advice to current lifestyle. Ask for small changes. Help teen-agers make high quality nutrition choices within their current eating patterns.

4. Provide alternative choices for eating out. For example, suggest a cheeseburger instead of a hamburger, milk instead of coke. Pizza and subs often contain high quality protein. Even vending machines offer peanuts, yogurt, juice.

5. Encourage snacks; emphasize good snack choices. Help decide on a list of high quality snacks. Cheese, peanut butter, fruit, yogurt, sandwiches, raw vegetables, hard-cooked eggs all may be popular.

6. Encourage frequent meals and snacks. Help think of ideas for problem meals - for example, eggnog or a homemade milkshake for breakfast, or encourage taking a "breakfast snack" to school.

7. Encourage taking vitamin/mineral supplements.

8. Support discontinuing smoking and drug/alcohol abuse.

9. Give support for concerns expressed - especially weight gain and body image. Offer help for weight control after birth.

10. Use positive reinforcement when possible. Tell her what she is doing right.

11. Remember, time is needed to establish rapport. Everything cannot be done in one visit.

12. Some adolescents may welcome a referral to a teen center or program that focuses on adolescent pregnancy and parenting issues.

Table 3-2. RDA'S FOR FEMALES 11-22 YEARS

RECOMMENDED DAILY DIETARY ALLOWANCES FOR FEMALES 11-22 YRS. — PREGNANT AND NON-PREGNANT

	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Protein (g)	Vitamin A (mcg RE)	Vitamin D (mcg)	Vitamin E (mg a-TE)	Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg NE)
Females	11-14	46	101	157	62	46	800	10	8	50	1.1	1.3	15
	15-18	55	120	163	64	46	800	10	8	60	1.1	1.3	14
	19-22	55	120	163	64	44	800	7.5	8	60	1.1	1.3	14
Pregnant						+ 30	+ 200	+ 5	+ 2	+ 20	+ 0.4	+ 0.3	+ 2

	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Vitamin B_6 (mg)	Folacin (mcg)	Vitamin B_{12} (mcg)	Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)	Iodine (mcg)
Females	11-14	46	101	157	62	1.8	400	3.0	1200	1200	300	18	15	150
	15-18	55	120	163	64	2.0	400	3.0	1200	1200	300	18	15	150
	19-22	55	120	163	64	2.0	400	3.0	800	800	300	18	15	150
Pregnant						+ 0.6	+ 400	+ 1.0	+ 400	+ 400	+ 150		+ 5	+ 25

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WEIGHT GAIN DURING PREGNANCY

4

Recommendations for optimal weight gain during pregnancy have changed rather dramatically over the years. Up until the early 1970's, weight gain was restricted, often to 10-15 lbs. Research in the early 1970's suggested that more appropriate gains range between 24-27 lbs. Very recent studies have refined recommendations to account for different body types and prepregnancy weights.

What accounts for these shifts in obstetric practice? In the eighteenth century, contracted pelves, caused by rickets common during industrialization and migration to the city, led to obstructed labor and maternal and infant death. Restricted weight gains were suggested to limit the size of the fetus and thus make delivery easier.

In the early part of this century, evidence also seemed to indicate that large weight gains were associated with pre-eclampsia and toxemia. In an effort to prevent these complications, recommendations for weight restrictions became routine.

While several studies (1,2) in the 1940's pointed to the importance of nutrition (and associated adequate weight gain) during pregnancy, conflicting studies in the 1950's (3,4) dampened budding enthusiasm. Attention was refocused on nutrition during pregnancy when a Task Force on Mental Retardation, formed by President Kennedy in 1962, reported alarmingly high infant mortality and morbidity rates in the United States. The report pointed to prematurity and low birth weight as important factors in infant mortality and morbidity and encouraged improved and expanded infant and maternal health care.

In 1970, the National Academy of Sciences issued **Maternal Nutrition and the Course of Pregnancy**, a landmark report that documented the importance of nutrition during pregnancy and reversed previous recommendations for weight gain.

DATA SUPPORTING CURRENT RECOMMENDATIONS

Evidence clearly indicates that weight gain should not be restricted during pregnancy. Potential complications of inadequate weight gain, especially in the third trimester, the period of most rapid fetal growth, are low birth weight (LBW) and neurological deficits in offspring. LBW is associated with infant mortality and morbidity, mental retardation, learning disabilities and poor growth. Birth weight above 5 lbs. 8 oz. is the chief determinant of infant survival in the first week of life when 80% of all infant deaths occur.

After gestational age, weight gain during pregnancy and pregravid weight are the most important determinants of birth weight. These two factors may exert their influence independently or additively.

(See Table 4-1 for a listing of all major factors known to affect birth weight.)

Several studies (5,6,7,8) done with large numbers of pregnant women have shown an almost straight line correlation between infant birth weight and weight gain during pregnancy. Pregravid weight is also positively associated with infant birth weight (5,8,9). As pregravid weight increases, the incidence of LBW decreases. When low weight gain and underweight occur together, the risk of LBW is great.

Epidemiological studies of weight gain in normal pregnancies of healthy women show that *average* weight gains range from 24-27 lbs (10). Estimates of the average weight of the combined maternal and fetal products of conception are about 27 lbs (10).

Table 4-1. FACTORS INFLUENCING BIRTHWEIGHT

Gestational Age
- This is the most important determinant of birth weight
- Weight of fetus increases 225 gm/week in 9th month of gestation[1]

Maternal Prepregnancy Weight for Height

Weight Gain in Pregnancy

Other Factors:
Diet (esp. kilocalories & protein)
Maternal height
Smoking
Socioeconomic status
Illness
Age
Alcohol
Stress
Race
Paternal size
Parity

[1] Winikoff, B.: Anthropometric determinants of birth weight. **Obstetrics and Gynecology**. 58:6, 1981.

Table 4-2. ANALYSIS OF WEIGHT GAIN AT 40 WEEKS* (10)

	grams	lbs
Fetus	3400	7.5
Placenta	650	1.4
Amniotic fluid	800	1.8
Uterus	970	2.1
Breasts	405	.9
Blood	1250	2.7
Extracellular, extravascular fluid	1680	3.7
Maternal stores	3345	7.4
Total Weight Gained	12500	27.5

*These figures are for a woman without generalized edema. A woman who has generalized edema will gain more total weight; less will be fat and more will be water.

Pattern of Weight Gain

The pattern of weight gain associated with healthy pregnancies is a sigmoid curve (almost a straight line after the first trimester). There is little weight gain in the first trimester, rapid gain in the second trimester and a somewhat slower rate of gain in the third trimester. Observations on large numbers of primagravidas indicate that the rate of gain is as follows: (10)

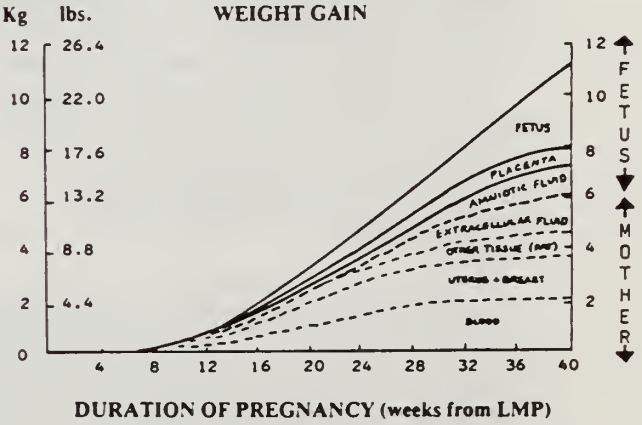
Weeks gestation	lbs gained per week
13 - 16	.8 lb / week
16 - 26/28	1 lb / week
28 - term	.8 - .9 lb / week

A rapid weight gain in one week (especially after the twentieth week) may indicate the edema associated with pre-eclampsia or it may simply indicate excess fat storage due to increased caloric intake or decreased physical activity.

Range

The range of weight gain among pregnant women who deliver healthy babies is great. In some studies the range was over 50 lbs, with weight gains ranging from -20 lbs to +41 lbs (10). While these statistics should not allow health professionals to relax if women have very low or very high weight gains, they do demonstrate the wide variations of normal. Young women and primagravidas tend to gain more weight than older women and multigravidas (10). Overweight women tend to gain less than normal weight or underweight women (5,9).

Fig. 4-1. PATTERN AND COMPONENTS OF AVERAGE MATERNAL WEIGHT GAIN DURING PREGNANCY.



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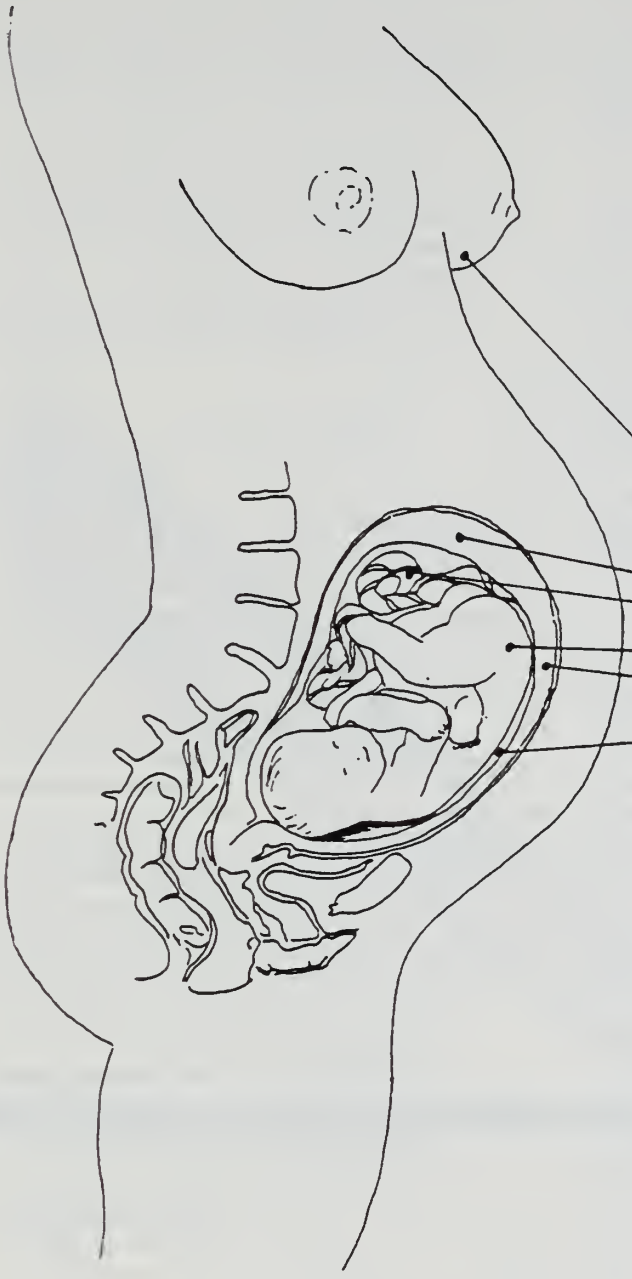
Weight Gain, Pregravid Weight and Perinatal Mortality

Recent studies focusing on mortality data (versus birth weight data) indicate optimal weight gain during pregnancy depends on prepregnant weight (8,11).

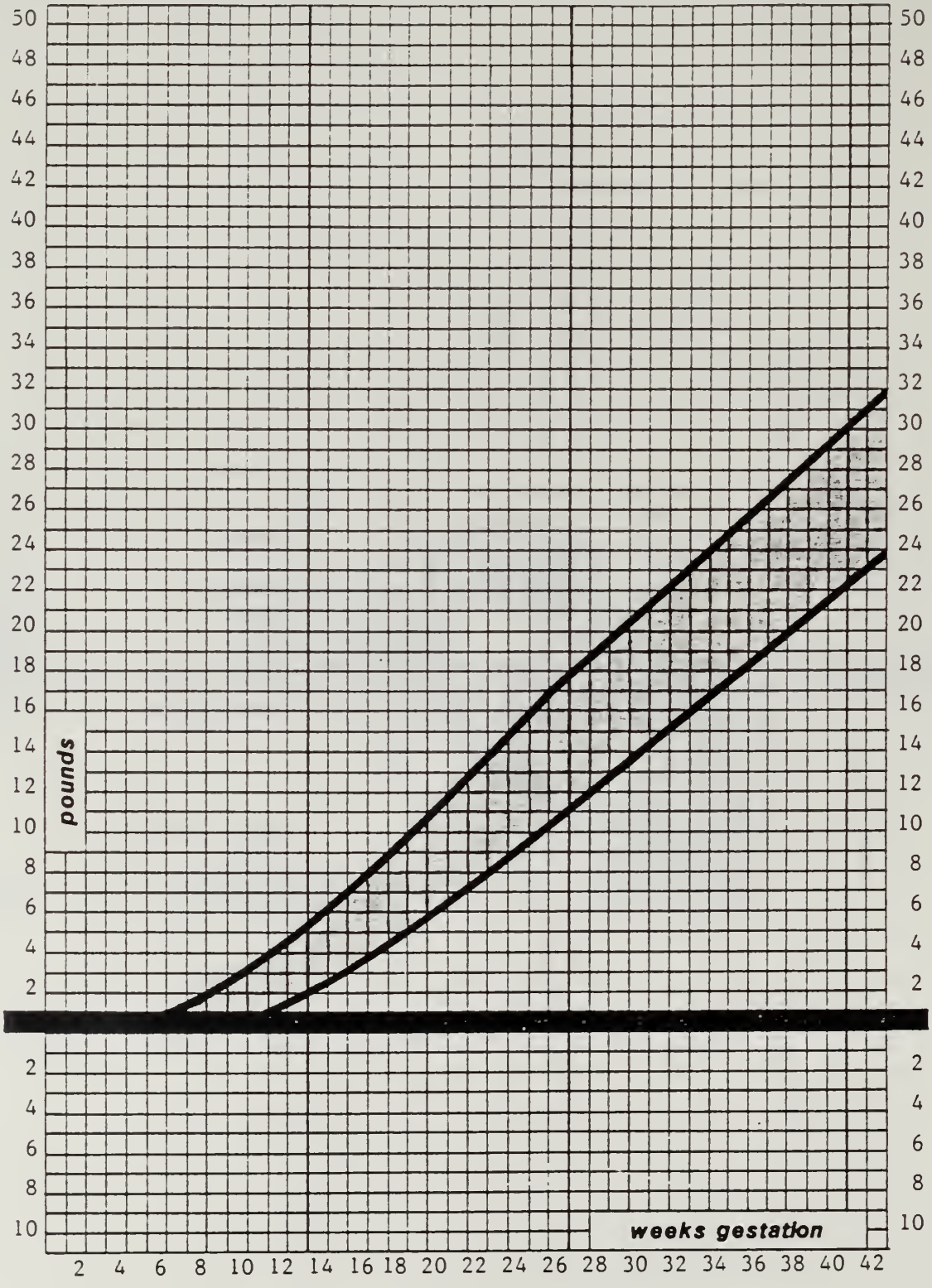
Figures 4-2 and 4-3 are effectively used to explain weight gain to pregnant women.

Fig. 4-2. WEIGHT GAIN IN PREGNANCY



Breasts	.9 lbs.
Placenta	1.4 lbs.
Blood	2.7 lbs.
Baby	7.5 lbs.
Uterus	2.1 lbs.
Amniotic Fluid	1.8 lbs.
Additional Fluid	3.7 lbs.
Stores	7.4 lbs.
Total Weight Gain	27.5 lbs.

Fig. 4-3. WEIGHT GAIN GRID—RANGES FOR WEIGHT GAIN



Overweight women (>135% of ideal body weight before pregnancy) had the lowest perinatal mortality rate with a weight gain of 15–16 lbs (the products of conception without additional fat storage.)

Normal weight women (90-135% of ideal body weight before pregnancy) had the lowest perinatal mortality rate at average weight gains of 20 lbs.

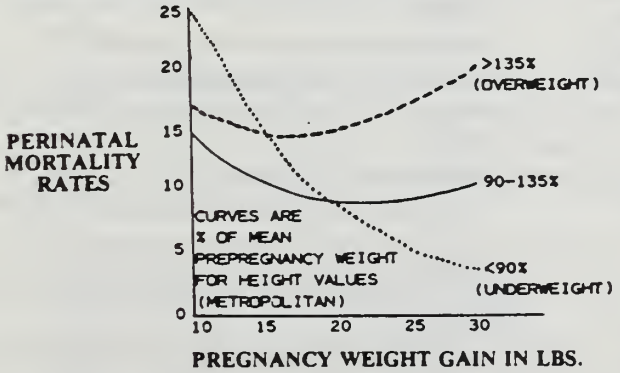
Underweight women (<90% of ideal body weight before pregnancy) had the lowest perinatal mortality rate at average weight gains of 30 lbs.

Another study (8) showed excess weight gain (over 30 lbs) increased the perinatal mortality rate, regardless of pregravid weight. In addition, for white women under 151 lbs before pregnancy, the perinatal mortality rate (for all weight gains) was 9.03%; for white women over 151 lbs before pregnancy, the perinatal mortality rate was 14.63% (for all weight gains).

RECOMMENDATIONS FOR WEIGHT GAIN

The following recommendations for weight gain during pregnancy are based on the past twenty years of research. Incorporated into the recommendations is current research which reports better outcome with slightly lower rates of gain for overweight and normal weight women than had previously been suggested. Ranges are given to allow some leeway, since only a few studies have demonstrated these results.

Fig. 4-4. Overweight mothers had the fewest fetal and neonatal deaths with a 15 or 16 pound weight gain in term pregnancies. The optimal gain for normally proportioned mothers was 20 pounds and for underweight mothers 30 pounds. With weight gains >20 pounds, underweight mothers had significantly lower perinatal mortality rates than those of mothers who were not underweight ($P<0.0005$). The underweight mothers in question had fewer losses to amniotic fluid infections, premature rupture of the fetal membranes, and major congenital anomalies.



Reprinted with permission from Naeye, Richard: Weight gain and outcome of pregnancy. American Journal of Obstetrics and Gynecology. 135:3, 1979.

Rate of Gain

For all women rate of gain is important. Rapid early gains in the first trimester should not prevent a woman from gaining along a standard curve during the rest of pregnancy even if this results in a larger final gain. Sudden sharp gains (after the 20th week) should be investigated to determine the cause.

Normal Weight for Height Before Pregnancy (90-135% of ideal body weight)

A gain of 24-30 lbs., following the pattern on the weight gain grid, is recommended. Twenty-four pounds represents the lower limit of the average range of physiologic weight gain observed in large populations of healthy normal pregnancies. Thirty pounds is chosen as an upper limit since recent studies indicate that gains above that may be associated with a higher perinatal mortality rate. In addition, gains over 30 lbs may mark the onset of maternal obesity which is a health risk in itself, and may exacerbate such conditions as hypertension and diabetes. Normal weight women who gain less than 20 lbs may be at risk for poor outcome of pregnancy. They need counseling and support.

Overweight for Height Before Pregnancy (>135% of body weight)

A gain of approximately 24 lbs following the pattern on the weight gain grid is recommended; this figure is generally cited as representing the low end of the range of normal prenatal weight gain. Gains in excess of 30 lbs have been associated with higher perinatal death rates, and may contribute to the existing weight problem. Gains less than 24 lbs are not recommended, despite the recent finding that a 15–16 lb weight gain in overweight women is optimal in terms of mortality data.

Limiting weight gain may allow caloric intake to fall below 36 kcal/kg of pregnant body weight, the critical point below which protein is oxidized for maternal energy at the expense of fetal growth. In addition, inadequate caloric intake may result in fat breakdown. The ketones produced cross the placenta and may cause neurological damage to the fetus. Maternal gestational acetonuria has been associated with significant decrease in IQ in offspring. Finally, weight for height standards used in the determination of overweight do not account for differences in body fatness and leanness which may affect energy metabolism in pregnancy. For all of these reasons, a safety margin is indicated in making recommendations.

Some overweight women may consciously wish to use pregnancy to lose weight. They realize that if little or no weight is gained and 15 lbs is lost after pregnancy, there will be a net loss. Others may be so

alarmed at the steady weight gain of pregnancy when they are already overweight that they begin to limit their intake.

Overweight women may benefit from a clear understanding of the components of weight gain and the possible consequences of low weight gain. Obese women may also have nutritionally deficient diets (low in protein, vitamins and minerals and high in fat and sugar). They may need close nutritional guidance to achieve nutritional quality during pregnancy (12).

Underweight for Height Before Pregnancy (<90% of ideal body weight)

An average of thirty pounds following the pattern on the weight gain grid is recommended. Gains less than this have been associated with higher perinatal mortality rates.

Underweight women may have as much difficulty in attaining desirable weight as overweight women. They too may be alarmed at their growing profile. In addition, their nutrition-related obstetrical risk at low weight gains is great. For these reasons, they may require intensive ongoing support and guidance.

Twins

40 lbs following the pattern on the weight gain grid is recommended. Relatively high gains may be protective against low birth weight and prematurity.

These recommendations are intended as guides. Wide variations occur in normal pregnancies. Healthly women eating to appetite should not be held to rigid weight gain patterns.

COUNSELING

For many women, the amount of weight gained during pregnancy is of great concern. Even the normal weight gain of pregnancy may worry them. Some women feel that they have lost control of their bodies during pregnancy, or that their weight gain bears no relationship to eating or activity patterns. They also find that weight gain during pregnancy is a double-edged sword. Friends, relatives and partners may pamper them with sweets and special foods and then tell them they are getting too fat. Women may wonder if they will ever feel or look the same, or if they will still be attractive to their partners.

Past ideas of limiting weight gain may still linger in the minds of many women. They may harbor vague fears of toxemia, which they associate with gaining too much weight. They may fear their prenatal visit because of the comments they think they will hear when they step on the scale. In fact, some women may still be reprimanded for gaining too much weight. Even simple statements of fact like "you gained one pound this week" can worry a woman enough so that she begins to limit her food intake.

A weight history should be discussed and recorded at one of the first prenatal visits. Concerns about weight gain which may make a woman fearful or apprehensive can be allayed at this time. In addition, all women will benefit from a mini lesson on weight gain during pregnancy, regardless of their own weight. The most important information includes the components of weight gain, optimal weight gain, appropriate patterns of weight gain and potential problems of inadequate or excessive weight gain. This information, conveyed in 5–10 minutes, serves to eliminate some of the confusion on the subject.

Two particularly useful aids in educating women about weight gain during pregnancy are a visual representation of the components of weight gain (Fig. 4-2) and the weight gain grid (Fig. 4-3).

The chart of the components of weight gain illustrates to the pregnant woman that the weight she gains is not all fat and baby. This is a revelation for many women (and men).

Allowing patients to follow their own weight gain on the weight gain grid (Fig. 4-3) may give them a greater understanding of their own pattern. However, reassurance that some deviation is normal is necessary. If the grid is used in counseling, care must be taken in explaining it. Many clients are unfamiliar with graphs and can become confused.

WEIGHT HISTORY

The weight history outlined below will give the nutritionist insight into a woman's concerns and her actual problems.

Ideally a prenatal weight history should include the following:

- height
- body frame size: small, medium, large
- weight for height status: normal, overweight, underweight
- usual non-pregnant weight
- level of physical activity – prepregnant and pregnant
- preferred weight gain this pregnancy
- obstetrician's advice on weight gain this pregnancy
- weight gain in past pregnancies, weight lost after birth
- weight gain this pregnancy
- prenatal gain plotted on weight grid with each visit

Height: Height in inches without shoes. Self-reported heights are frequently inaccurate and should not be used.

Body frame size: This may be determined by using Fig. 4-5.

Fig. 4-5. BODY FRAME TYPE

TO MAKE AN APPROXIMATION OF YOUR FRAME SIZE...

Extend your arm and bend the forearm upward at a 90 degree angle. Keep fingers straight and turn the inside of your wrist toward your body. If you have a **caliper***, use it to measure the space between the two prominent bones on either side of your elbow. Without a caliper, place thumb and index finger of your other hand on these two bones. Measure the space between fingers against a ruler or tape measure. Compare it with these tables that list elbow measurements for **medium**-framed men and women. Measurements lower than those listed indicate you have a **small**-frame. Higher measurements indicate a **large**-frame.

Height in 1" Heels	Elbow Breadth
Men	
5'2"-5'3"	2½"-2⅞"
5'4"-5'7"	2⅝"-2⅞"
5'8"-5'11"	2¾"-3"
6'0"-6'3"	2¾"-3⅛"
6'4"	2⅞"-3¼"
Women	
4'10"-4'11"	2¼"-2½"
5'0"-5'3"	2¼"-2½"
5'4"-5'7"	2⅜"-2⅝"
5'8"-5'11"	2⅜"-2⅝"
6'0"	2½"-2¾"

3/83 Adapted from Metropolitan Height and Weight Tables

*To obtain a caliper, called the "Elbow Breadth Frame Gauge", write to:
Metropolitan Insurance Company
Health and Safety Education Division
1 Madison Avenue
New York, New York 10010
$5.00 (8/88)

Pregravid weight: Weight (in indoor clothing) immediately before last menstrual period, not weight at first prenatal visit. This weight can be difficult to obtain because a woman may not know her pregravid weight, or may not wish to be candid about it if, for instance, she believes she has already gained too much weight or was overweight before her pregnancy.

Weight for height status: Assessment of weight for height status is controversial. See the references listed (14-18) at the end of this chapter for more information about the pro's and con's of various assessment tools. Below is one suggested method:

- Referring to Table 4-3, find the mid-point of the weight range corresponding to the height and body frame size as determined by measurement.
- Pregravid weight falling between 90-135% of this weight is normal; >135% is overweight; <90% is underweight.

Table 4-3. HEIGHT AND WEIGHT TABLE - WOMEN (indoor clothing, no shoes)

These tables correct the 1959 Metropolitan standards to height without shoe heels.

Height	Small Frame	Medium Frame	Large Frame
4'8"	92-98 lbs	96-107 lbs	104-119 lbs
4'9"	94-101	98-110	106-122
4'10"	96-104	101-113	109-125
4'11"	99-107	104-116	112-128
5'0"	102-110	107-119	115-131
5'1"	105-113	110-122	118-134
5'2"	108-116	113-126	121-138
5'3"	111-119	116-130	125-142
5'4"	114-123	120-135	129-146
5'5"	118-127	124-139	133-150
5'6"	122-131	128-143	137-154
5'7"	126-135	132-147	141-158
5'8"	130-140	136-151	145-163
5'9"	134-144	140-155	149-168
5'10"	138-148	144-159	153-173
5'11"	142-152	148-163	157-177
6'0"	146-156	152-167	161-180

From Grant, Anne: **Nutritional Assessment Guidelines**, Seattle; Anne Grant, 1979.

Usual non-pregnant weight: The difference between usual non-pregnant weight and pregravid weight shows important weight changes. For instance, weight loss indicates nutrition depletion, while weight gain prior to pregnancy may make a woman reluctant to gain weight.

Usual non-pregnant weight is subject to similar error. Sometimes a woman considers what she weighed ten years ago to be her usual non-pregnant weight. She may have no idea what her normal weight is, or her weight may be subject to wide fluctuations. Sensitivity and non-judgmental questioning are necessary to determine these weights. A women must feel that this information will be used to help her.

It is also useful to know if the woman was on any diets before she got pregnant, and what type they were.

Preferred weight gain in pregnancy: Women often have ideas about how much they think they should gain or how much they want to gain. These ideas come from past experience (gaining excess weight in previous pregnancies and not losing it), from opinions of relatives and friends, from their own worries and fears, and from their obstetricians or nurses.

Level of physical activity: Sedentary, light or moderate. Based on the woman's occupation and the information gathered about activity in a typical day, a rough estimate of the level of physical activity can be made using this guideline: (13)

Light - Client spends the equivalent of 3 hours per day in activity as strenuous as waiting on tables or doing carpentry, *plus* the equivalent of 1 hour per day in activity as strenuous as playing tennis or scrubing floors; the remaining time is spent sleeping, sitting, or in activity less strenuous than the above, such as ironing or typing.

Sedentary - Less activity than light.

Moderate - More activity than light.

The recommended calorie levels for pregnant women are based on energy expenditure with light activity. However, virtually all pregnant women, like most Americans are sedentary. For this reason, adequate weight gain in pregnancy is not uncommon with caloric intakes less than the recommended levels. The client with moderate activity or more needs about 300 calories per day more than recommended levels.

Obstetrician's advice about weight gain: The advice of other health professionals often has a real impact on women's ideas. If the nutritionist and obstetrician should disagree and give conflicting advice, the woman will be confused. Ideally, disagreements between health professionals should be resolved for optimum patient care.

Weight gain in past pregnancies, weight loss after birth: This often gives useful background information about a woman's attitude toward weight gain. If she has gained a lot of weight in past pregnancies and has not lost it, she will be anxious about gaining during the current pregnancy. If she has gained a lot during past pregnancies, but always loses it all, she probably will not be concerned about adequate or more than adequate weight gains.

Family weight history: This will have some bearing on her own worries and on her chances for successful weight loss after delivery.

Weight gain this pregnancy: Weigh woman with light indoor clothing, minus her shoes. Subtract prepregnancy weight from present weight.

Weeks gestation: "Gestation Calculators" are available from various sources. Many women already know their due date.

Plot weight on prenatal weight grid: This method of figuring weeks gestation can be used if the due date is known.

1. Count number of weeks (backwards) from due date to current date.
2. Subtract this number of weeks from 40 weeks (full term pregnancy) to arrive at present number of weeks gestation.
3. Plot current weight gain at current week gestation.
4. If pregravid weight is unknown, weight gain may be inaccurate at first visit. After the first visit, weight gain can be plotted accurately.

If only the date of the last period is known, Naegles' Rule — add seven days to onset of last period and subtract three months — can be used to obtain the due date.

The grid represents an average pattern to which most women will not conform exactly. It does provide, however, a graphic method for the identification of significant deviations from normal. Such deviations require further investigation, medical or nutritional, or both. Many factors influence the course of weight gain in pregnancy: caloric intake, physical activity, edema, disease and others. A "good" weight gain is not synonymous with adequate prenatal nutrition in an overall sense; in particular, it gives no information about dietary quality. At best, the grid is an indirect measure of energy balance in pregnancy.

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LABORATORY INDICES DURING PREGNANCY

5

Blood levels of most nutrients change during pregnancy. Some decrease (especially glucose, total protein, and water-soluble vitamins) and some increase (especially lipids, fat-soluble vitamins, alpha- and beta-globulins and some amino acids). Some decreases can be explained by the dilutional effect of expanded blood volume. However, dilution does not explain all decreases – glucose and amino acid levels, for example – which occur in very early pregnancy before blood volume begins to increase. Excessive urinary excretion does not seem to correlate with decreased blood levels. Dietary deficiencies cannot explain many nutrient decreases occurring in healthy pregnancies of well-nourished women. In fact, many decreases are not understood at present.

Increases are even less well-understood, although they seem to be related to hormonal changes during pregnancy. The reasons for these increases are still being studied.

In any event, laboratory tests performed on pregnant women cannot be measured against non-pregnant standards. New standards, indicating normal pregnant values, are slowly being developed (1).

ROUTINE LABORATORY TESTS

The following tests are usually performed at the initial prenatal visit.

Complete Blood Count (CBC)

This test includes hemoglobin, hematocrit, red cell indices, reticulocyte count, red cell count, leukocyte count and peripheral bloodsmear.

Urine: Culture and Sensitivity

A urine culture detects the presence of bacterial colonies causing urinary tract infections. If colonies are present, a urine sensitivity is done to determine the antibiotics to which the bacterial colonies are either sensitive or resistant.

Table 5-1. URINARY TRACT INFECTION

< 10,000 colonies	negative
10,000-100,000 colonies	possible infection
> 100,000 colonies	urinary bacterial infection. A repeat culture is usually obtained before treatment, especially if the woman is asymptomatic.

Tine

A positive tine test indicates a reaction to tuberculosis bacteria. A positive test is normally

followed up with a mantoux test or PPD (purified protein derivative).

Pap Smear – Cervical Cytology

The Papanicolaou smear detects abnormal cells in the cervix. It is used as a screen for carcinoma of the female genital tract; in pregnancy, it is also used to detect Herpes virus. Pap smear results are usually reported as negative or atypical (cells are described). Some physicians report results as Class I - V. Suspicious pap smears are usually followed up with a repeat smear, office biopsy, colposcopy or other diagnostic measure.

Rubella Titer

The rubella titer detects the presence of antibodies to rubella. A hemoagglutination-inhibition test (HAI) $>$ 1:10 indicates the woman is immune (has had a previous rubella infection or a vaccination). A woman with an HAI $<$ 1:10 should be told to stay away from children who have rubella (German measles). Serious deformities can occur in the infant of a mother who contracts rubella in her first trimester.

Gonorrhea Culture

A smear from the endocervical canal is cultured to detect gonococci indicating gonorrheal infection.

Rh Factor

If blood is Rh negative, antibody titers are taken during pregnancy. The blood type of the father is also checked. If the father is negative, serial titers are unnecessary. Rhogam is given prophylactically at 25 weeks and titers checked again at delivery.

Blood Type and Antibody Screen

These tests determine blood type and presence of unusual or abnormal antibodies.

Sickle Cell Screen

Sickle cell anemia occurs in black Americans. Positive tests would describe cells.

Syphilis

Tests for syphilis include Hinton, venereal disease research lab (VDRL), fluorescent treponemal antibody absorption (FTA) and rapid plasma reagent (RPR). They detect the presence of antibodies against trepc ema pallidum, or antibody-like substances called reagins.

All results are reported as reactive, weakly reactive or non-reactive. Tests for syphilis are not absolutely specific and vary in their sensitivities. Some samples may be reactive in one test and non-reactive in another. The physician must often interpret conflicting results. Biologically false positives occur with some diseases.

The following tests are usually performed at each prenatal visit.

Urine

At each prenatal visit, a urine sample is tested for the presence of glucose, ketones and protein. The urine may be checked for red blood cells, white blood cells and casts. Sometimes the woman is asked to bring in the first morning urine sample so that breakfast food intake will not affect the sample. Many clinics and offices ask for a clean catch specimen so that the presence of urinary tract infection can also be checked.

These tests are performed by dipstick method. Changes in color on the dipstick may indicate the presence of the following substances in the urine:

- **Glucose:** More than a trace of glucose is usually followed up with an oral glucose tolerance test (GTT), although glycosuria is common in pregnancy.
- **Protein:** Indicates presence of protein (primarily albumin) in urine. A result of 1 + or more may indicate preeclampsia or renal disease. Values are usually recorded as:

	mg/100 ml
negative	2 mg
trace	5–20 mg
+	30 mg
+ +	100 mg
+ + +	300 mg
+ + + +	1000 mg

- **Ketones:** Indicates presence of ketone bodies (e.g., acetone, acetylacetic acid, beta-hydroxybutyric acid). Abnormal values may indicate incomplete fat metabolism and acidosis as seen in starvation or very low carbohydrate weight reduction diets and uncontrolled diabetes.
- **Blood:** Indicates presence of red blood cells, free hemoglobin or myoglobin in urine. Blood in the urine may indicate cystitis, calculi (stones), glomerulonephritis or neoplasm.
- **White blood cells:** Presence of white blood cells may indicate infection in the genitourinary tract.
- **Casts:** The presence of casts may indicate nephrotic syndrome.

Blood Pressure

Blood pressure is also measured at each visit. Normal systolic pressure may be slightly below normal non-pregnant values in mid-pregnancy: it rises to the non-pregnant average near term. Diastolic pressure may drop until the last trimester, when it returns to normal. The following represent significant increases in blood pressure during pregnancy.

Table 5-2. LABORATORY VALUES IN NORMAL PREGNANCY

Test	Definition	Normal Non-Pregnant Values	Normal Pregnant Values	Notes
Red blood cell count	Number of erythrocytes per cubic mm of blood	4.2 - 5.9 million	3.7 - 4.1 million	
Hematocrit	% of blood occupied by RBC after centrifugation	37 - 48%	≥33%	
Hemoglobin	Amount of Hgb per 100 ml blood	12 - 16gm	≥11gm	
MCV (Mean Corpuscular Volume)	$\frac{\text{Hct}}{\text{RBC count}} \times 10$ Indicates size of RBC	80 - 94 cubic microns	same	Low values indicate microcytosis due to iron deficiency. High values indicate macrocytosis due to folic acid or B_{12} deficiency.
MCH (Mean Corpuscular Hemoglobin)	$\frac{\text{Hgb}}{\text{RBC count}} \times 10$ Amount of Hgb in an average RBC	27 - 32 pg	same	
MCHC (Mean Corpuscular Hemoglobin Concentration)	$\frac{\text{Hgb}}{\text{Hct}} \times 100$	32 - 36%	same	Low values indicate macrocytic anemia.
Reticulocyte Count	% of immature RBC in blood	0.5% - 1.5%	increases to 1 - 2% or more	Low values indicate underproduction of RBC, probably due to nutritional anemia. Within 5 - 10 days of treatment values should increase. High values indicate hemorrhage, hemolytic anemia, or response to iron.
Peripheral Blood Smear	Visual estimation of size, shape, structure and Hgb content of RBC			Indicates macrocytosis, microcytosis, hypochromia, sickle cell and other abnormalities.
Leukocyte Count	White blood cells per mm3	4,300 - 10,800	increases	
GLUCOSE Fasting	mg/100 ml (whole blood) after 12 hr. fast	≤110	≤90	
Screen	50 g. oral glucose - blood drawn 1 hr. later	≤160	≤130	
Oral GTT	100 gm glucose after 12 hr. fast	≤ 110 (130) Fasting ≤ 170 (195) 1hr. ≤ 120 (140) 2hrs. ≤ 110 (130) 3hrs.	≤ 90 (105) ≤165 (190) ≤145 (165) ≤125 (145)	Two or more values greater than upper limits indicate abnormal test.
NOTE: Whole blood glucose levels are lower than plasma levels. To convert whole blood glucose to plasma glucose, multiply whole blood values by 1.14. Plasma glucose values for normal non-pregnant women are in parentheses.				
Serum protein	gm/100 ml	6.0 - 8.4	6, decreases	
Serum albumin	gm/100 ml	3.5 - 5.0	≥ 3.5, decreases	
Serum globulin	gm/100 ml	2.3 - 3.5	increases	
BUN-blood urea nitrogen	mg/100 ml	8 - 25	decreases	
Creatinine	serum - mg/100 ml	0.6 - 1.5	decreases	
Uric acid	serum - mg/100 ml	3.0 - 7.0	decreases	
Folate	serum - ng/ml	≥6	>3, decreases	
RBC Folate	ng/ml	≥160 - 650	same	
B_{12}	serum - pg/ml	90 - 280 70 - 90 borderline	240 decreases	

Table 5-2 gives laboratory values for some standard laboratory tests. In some cases, normal pregnant values are still being determined through field studies. Normal values, if reported, would be the result of only a few studies. In these cases, the table indicates whether values increase or decrease in pregnancy. The data for table 5-2 was taken from the following sources:

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- blood pressure of greater than 140/90.
- an increase of 30 mm systolic pressure or 15 mm diastolic pressure above the normal blood pressure for that person.

OTHER TESTS

These tests are not performed on a routine basis:

Vitamins

Biochemical measurements of vitamins during pregnancy vary with the method of assay and are influenced by maternal age, intake of supplements, season of the year, parity, smoking, previous use of oral contraceptives, use of drugs, and sex of the fetus. Normal pregnancy values for most vitamins have not been established.

Lipids

Lipid changes are marked in pregnancy and are not usually determined in routine prenatal assessment. Triglycerides increase 2½ to 4 times above non-pregnant levels and there is a 25% rise in cholesterol and phospholipids. Values return to normal by six to eight weeks postpartum.

Oral Glucose Tolerance Test (GTT)

A GTT or a one-hour post-prandial blood test is done if there is any suspicion of diabetes.

Red Blood Cell Folate, Serum Folate or Serum B_{12}

These tests may be done if folate or B_{12} deficiency is suspected.

Other tests include amniocentesis to detect metabolic or genetic disorders, alpha fetoprotein to detect spinal cord abnormalities, and pelvic ultrasound to detect multiple births or to follow fetal growth. Many other specialized tests have been developed to determine fetal well-being, especially near term.

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GI DISTRESS IN PREGNANCY 6

NAUSEA AND VOMITING

Gastrointestinal distress, as commonly exhibited by nausea and vomiting, occurs in half or more (1,2) of all pregnancies, yet its cause and course have been little studied. A number of factors have been hypothesized as causing pregnancy nausea and vomiting (PNV): increased human chorionic gonadotropin (HCG) levels in the first trimester; other hormones (such as estrogen, prolactin, growth hormone, follicle-stimulating hormone and others); abnormal liver function; psychological factors, especially what has sometimes been referred to as a "rejecting" attitude towards pregnancy; vitamin deficiencies, especially vitamin B_6. Until recently, the HCG hypothesis was most favored. However, studies done in the last few years have failed to show a correlation between HCG levels and PNV (2,3).

Perhaps the weakest hypothesis is the notion that pregnancy vomiting represents conscious or unconscious rejection of the pregnancy (4). While anxiety is thought to play a role in some severe cases of pregnancy vomiting, the sources of anxiety in these women have been found to be straightforward and reality based, e.g., fear of labor and delivery, or of the anticipated demands of mothering. Brief psychotherapy has been reported to be effective in some cases (5).

The etiology of pregnancy nausea and vomiting remains unknown.

In evaluating the individual patient for PNV, the physician must rule out physical causes other than the changes of pregnancy, specifically, infection, flu, cholecystitis, appendicitis, bowel obstruction, toxic substances, drug sensitivity, brain tumor, thyroid, and liver disease. Vomiting in the last trimester is especially worrisome, and may be a symptom of jaundice or imminent pre-eclampsia (6).

The first epidemiological study of PNV was reported in 1983 in Sweden (2); 244 women who had given birth to at least 3 children responded to a questionnaire. The findings are highlighted below:

- 7 out of 10 pregnancies were associated with PNV.
- 52% of the women studied always had nausea in pregnancy; 17% never did.
- For 91% of the women, the onset was the first trimester; for 3%, it was the last trimester.
- For most women, the duration was 3 months; for some, it was present throughout the pregnancy.
- The duration of vomiting decreased with the number of pregnancies a woman had had.
- 12% were unable to continue their usual work because of PNV.
- Women with pre-existing gastritis, symptoms of gallbladder disease or any sort of allergy had more PNV.
- Women with a history of side effects to oral contraceptive agents had more PNV.
- In twin pregnancies, 7 out of 8 had PNV.

Although this study did not explore immediate triggers to PNV, clinical experience points to a number of commonly cited factors:

- fatigue
- odors (especially cooking odors)
- food preparation
- bending over after eating
- irregular eating patterns
- empty stomach
- alcohol
- spicy foods
- fatty or fried foods
- chocolate
- foods sometimes popularly referred to as "acid" foods, such as tomato sauce and citrus juices
- caffeine-containing beverages
- carbonated beverages
- vitamin and mineral supplements

Counseling

Unfortunately, it is not uncommon for health professionals to project negative or non-caring attitudes towards the woman with PNV, for a number of reasons. These may include misconceptions about maternal psychological issues and PNV; frustration with women who may have "atypical" patterns (i.e., nausea does not end with the first trimester); perception of the condition as trivial because it seldom endangers health and is usually self-limiting.

The first goal of nutrition counseling in PNV is to ensure adequate caloric intake, even if nutrient quality is temporarily sacrificed. While a woman is nauseous, she should eat whatever appeals to her and agrees with her. She should identify those factors which specifically bother her (fatigue, hunger, etc.) and work towards eliminating them. Often experimenting with several changes – one or two at a time – is necessary. Symptoms may persist despite serious efforts to adjust diet or lifestyle.

The following may be suggested, as is appropriate to the individual:

1. Eat simple, high carbohydrate foods such as crackers, toast or cereal before rising, to raise blood sugar levels in the morning when nausea often occurs.
2. Consume high protein foods such as peanut butter, hard cooked eggs or cheese, especially as night snacks, to maintain a steady blood sugar level and prevent a drop in blood sugar the following morning.
3. Eat regularly spaced meals and snacks to maintain blood sugar levels throughout the day.
4. Eat small meals with one or more snacks between meals to assure that the stomach is never empty, minimizing vagal irritation.
5. Take liquids one to two hours after meals instead of with meals, to decrease the volume of intake at any one time.
6. Avoid bothersome foods and beverages. This will be a highly individualized matter.
7. Minimize home food preparation. For example, make sandwiches instead of cooking a meal; get help in the kitchen; eat out.
8. Open windows to get fresh air.
9. Take supplements after meals or at bedtime.

Bendectin, the last remaining anti-emetic medication specifically for PNV, was withdrawn from the U.S. market by its manufacturer in 1983. (See the "**Antihistamines/Antinauseants**" section of the chapter on **Drugs and Pregnancy** for more information.)

Because vitamin B_6 was part of the Bendectin formulation and was used as an antinauseant prior to the introduction of Bendectin, it is sometimes suggested that pregnant women take pyridoxine to relieve nausea. However, the effectiveness of the vitamin in combating nausea is questionable (6). Moreover, toxicity to vitamin B_6 was recently reported for the first time (10) albeit in greater doses than the 20mg or so usually recommended for pregnancy nausea. However, self-dosing in amounts greater than prescribed is common, and practitioners should be aware of this practice.

Hyperemesis Gravidarum

Hyperemesis gravidarum is severe vomiting in pregnancy leading to weight loss, electrolytic imbalance and dehydration. It occurs in an estimated 1-5% of pregnancies (6). It can be a life-threatening condition, and requires hospitalization, intravenous feeding, sedation and psychological support. The role of the nutritionist in this therapy has been described in detail in a recent article (7).

Although its etiology is unknown, recent studies indicate that some patients with hyperemesis gravidarum exhibit what appears to be a special, transient form of hyperthyroidism (8,9). (Vomiting is one manifestation of hyperthyroidism.)

In one study, infants born to hyperthyroxinemic mothers with hyperemesis gravidarum had significantly lower birth weights than controls, despite the fact that the vomiting had been controlled – within one week or one month – after the institution of standard treatment for hyperemesis gravidarum (8). Thyroid function returned to normal within the same time frame. Further study is needed to clarify the difference between this transient hyperthyroidism and primary hyperthyroidism, and also to determine the cause of the lower birth weights observed. Malfunction of the thyroid, weight loss in pregnancy, or both, could be the cause.

HEARTBURN

Heartburn is caused by food and gastric acids backing into the lower esophagus, producing a burning sensation near the breast bone and up into the throat. Relaxation of the cardiac sphincter (due to progesterone) and pressure on the stomach from the enlarged uterus commonly cause reflux after a large meal.

Counseling

Following are some ways to alleviate heartburn:

1. Eat small, frequent meals or snacks.
2. Avoid bothersome foods (usually fried, fatty or highly seasoned foods, coffee, cola, carbonated or alcoholic beverages).
3. Eat small amounts of bland food (such as 1-2 ounces of milk or one saltine) at intervals between meals to help absorb acid.
4. Eat 2-3 hours before bedtime, instead of immediately before bedtime.
5. Sleep in an elevated position. A mattress raised slightly by bricks and boards may be better than two pillows propping only the head.

Fig. 6–1. Using only additional pillows may aggravate heartburn. Elevating the entire mattress is more effective.

CONSTIPATION

Relaxation of GI muscles due to progesterone and pressure of the enlarged uterus on the intestine are primarily responsible for constipation during pregnancy. Iron supplements may also contribute to constipation.

Counseling

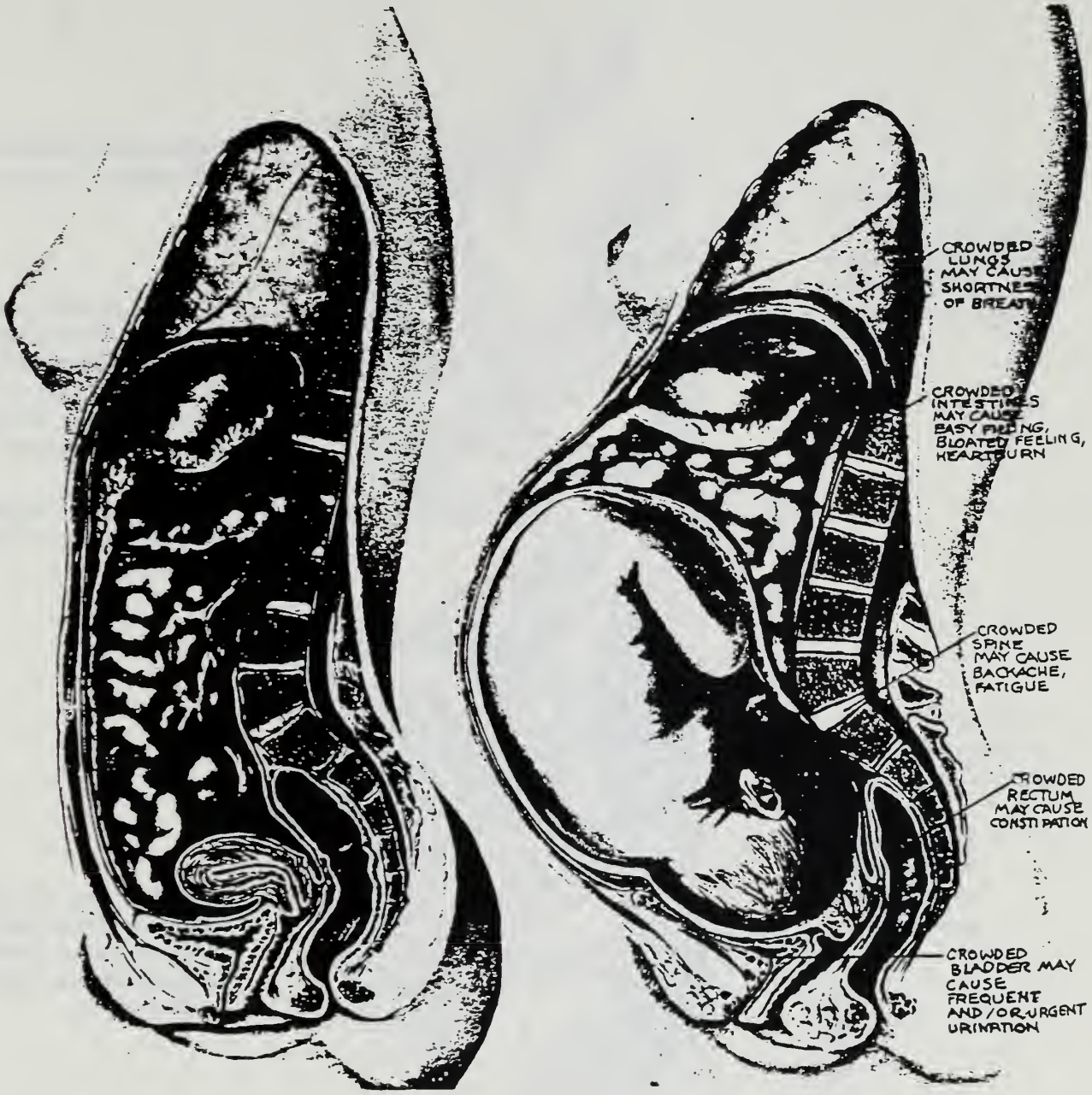
Following are ways to ease constipation:

1. Increase physical activity to increase peristalsis.
2. Increase intake of dietary fiber (indigestible carbohydrate in plant foods, fruits, vegetables and whole grain products) to produce softer, bulkier stools.
3. Increase intake of fluid (water and fruit juice) also to produce softer stools.
4. Check amount of iron supplements; a woman may be receiving more than necessary.

Continuation of iron supplements is usually possible with dietary change. Dietary treatment is preferable to laxatives. Metamucil - a dietary fiber - can be used in place of laxatives when constipation does not respond to dietary treatment. Metamucil can be bought over-the-counter.

Figures 6–2, 6–3, and 6–4 are effective for use in explaining the discomforts of pregnancy to pregnant women.

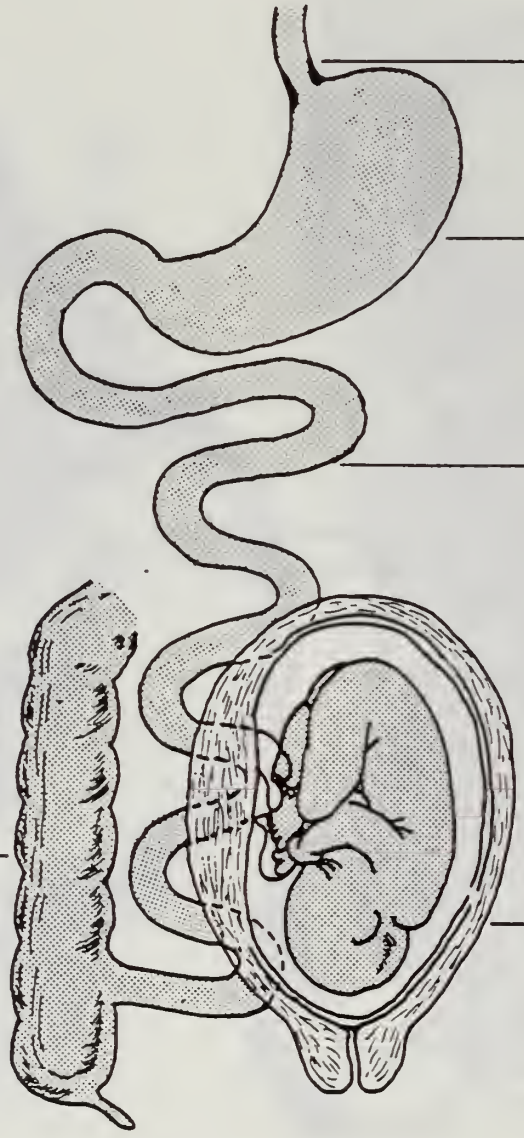
Fig. 6–2. EFFECTS OF FETAL GROWTH


CROWDED LUNGS MAY CAUSE SHORTNESS OF BREATH
CROWDED INTESTINES MAY CAUSE GASSY FEELING, BLOATED FEELING, HEARTBURN
CROWDED SPINE MAY CAUSE BACKACHE, FATIGUE
CROWDED RECTUM MAY CAUSE CONSTIPATION
CROWDED BLADDER MAY CAUSE FREQUENT AND/OR URGENT URINATION

Seeing how the expanding baby and uterus pushes your body around inside may help you identify reasons for the discomforts you feel.

Photograph reprinted from **Birth Atlas**, copyright Maternity Center Association, New York. Caption and labels reprinted with permission from Marzollo, Jean: **9 Months, 1 Day, 1 Year.** New York: Harper and Row, 1975.

Fig. 6-3. CHANGES IN GASTRO-INTESTINAL TRACT



Relaxation of sphincter → regurgitation → heartburn.

Slight reduction in gastric secretion and diminished gastric motility results in slow emptying → more efficient pulping of food... may also cause nausea.

Reduced motility in small intestine - increases time for absorption.

Reduced motility of large intestine - tends to induce constipation.

Growth of fetus and uterus - increases appetite and thirst. In late pregnancy pressure of the uterus reduces capacity for large meals.

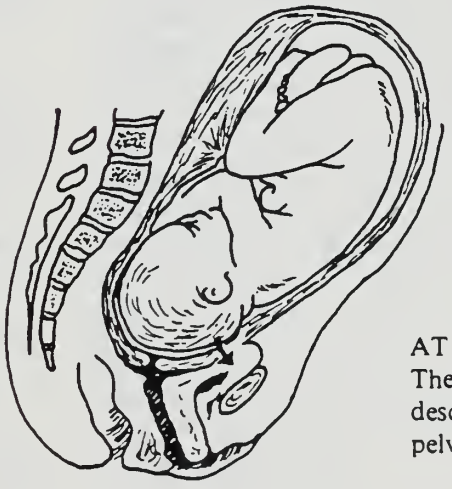
Adapted with permission from Garrey, Matthew, Govan, A.D.T., Hodge, C. and Callendar, R.: **Obstetrics Illustrated**, 3rd edition, Edinburgh: Churchill Livingstone.

Fig. 6–4. BLADDER CHANGES

Frequency of urination is a common symptom in early pregnancy and again at term.

EARLY PREGNANCY
The uterus is enlarging within the pelvis, thus compressing the bladder⟶ frequency.

MID PREGNANCY
The uterus is lifted out of the pelvis⟶normal urination.



AT TERM
The head of the fetus descends into the pelvis⟶ frequency.

Adapted with permission from Garrey, Matthew, Govan, A.D.T., Hodge, C. and Callendar, R.: Obstetrics Illustrated, 3rd edition, Edinburgh: Churchill Livingstone.

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DRUGS AND PREGNANCY

7

A growing body of research is beginning to clarify the extraordinarily complex physiologic and chemical events that transpire during fetal life. The tragedy of thalidomide showed that drugs taken during pregnancy can have a severe and damaging effect on fetal development. The effects of diethylstilbestrol (DES) on female offspring 15-20 years after being taken by pregnant women indicates the action of a drug is not always immediately discernable. Concern continues to mount that the ingestion of drugs during pregnancy increases the risk for fetal harm.

Drugs include everything from medicines prescribed by physicians (such as antibiotics), over-the-counter remedies (such as aspirin, cold tablets and vitamins), and lifestyle and culture drugs (such as alcohol, heroin, cocaine, marijuana, caffeine and nicotine). Also suspect are pollutants, radiation, heavy metals, food additives, pesticides, household chemicals and the host of other chemicals that abound in the general environment.

Drugs may have a *teratogenic* effect - producing physical, functional, mental, psychological or behavioral malformations in the fetus or infant after birth. Drugs may also be *carcinogenic* - producing cancer at some future time after birth. A drug may be *mutagenic* - producing offspring with different characteristics from the paternal type. Mutagenic agents may or may not be harmful. And finally, drugs can also be *addictive* - producing withdrawal symptoms in the neonate.

Pregnancy is a time of many minor discomforts. Women often look to drugs to alleviate their distress. A woman commonly takes four to five medications during pregnancy (3), often without the knowledge of her physician. Obviously, education about the effects of drugs on the fetus is an important aspect of prenatal care.

Unfortunately, limited scientific data are available on drug use during pregnancy. Since thalidomide, more research has begun. However, much remains unknown. Animal data is not necessarily useful since drugs may have totally different effects on animals than on humans. Epidemiological studies require laborious documentation of drug ingestion and may only yield limited data - or nothing conclusive. For any single drug, cause and effect can only rarely be proven. Safe dosage amounts are not known either. Large doses, reaching the fetus in higher concentrations, do not necessarily cause more problems than small doses, reaching the fetus in smaller concentrations.

For these reasons, health practitioners cannot

definitively say whether drugs are safe or not. Therefore, the best practice is to avoid all drugs during pregnancy unless they are essential for maternal health. Drugs are commonly required for chronic conditions - epilepsy, replaced heart valves, heart disease, renal transplant recipients, chronic lung disease and endocrine disease (thyroid and diabetes).

PRESENT KNOWLEDGE ABOUT DRUG ACTION

Placental transport: The placenta does not act as a barrier, protecting the fetus from potentially dangerous substances. Substances of low molecular weight (less than 1000) including nearly all medications, diffuse freely across the placenta. The few substances which do not reach the fetus via the placenta include hypothalamic and pituitary hormones, triiodothyronine, insulin, catecholamines and heparin. Virtually everything else does reach the fetus to some degree.

A drug taken by a pregnant woman enters her bloodstream, passes through the placenta, enters the fetus, and eventually passes back into her circulatory system for elimination (unless birth has intervened).

Periods of vulnerability: Chemical substances can have detrimental effects from conception to birth.

Early embryonic period (Conception to three weeks): This period has been considered relatively safe. However, recent animal studies suggest that severe damage or death of the embryo (resulting in abortion), prevention of implantation and drug penetration of the preimplantation blastocyst may all be possible (2).

Embryonic period (3.5 - 10 weeks): During the period of organogenesis, chemical substances could interfere with normal development. Severe malformations of organs or of physical structure are the most obvious dangers. In additon, postnatal behavior or function can be retarded or defective (2).

Fetal period (10 weeks – birth): Although organogenesis is complete, tissue injury, growth retardation, distributed organ function and prematurity are possible. Insults to the brain may also be possible (2).

Although no period of fetal life is safe from the effects of drugs, the fetus is probably most vulnerable during organogenesis. At this time many women do not even know they are pregnant.

Drugs may also interfere with the placental blood supply or with the passage of oxygen, glucose or other vital substances. In addition, drugs may affect maternal functions important for fetal growth. Reduction in the oxygen-carrying capacity of the blood, alteration in blood glucose levels, reduction in the availability of essential vitamins, hormones, amino acids and trace elements are all examples of maternal changes which could affect fetal well-being for well or ill (3-4).

Paternal drug use and maternal preconception drug use are largely unexplored areas. Some evidence indicates both may have an effect on the fetus (2,5).

The rest of this chapter discusses possible effects of specific drugs on the fetus. The drugs included are ones most commonly encountered among pregnant women, or ones that particularly relate to nutrition, e.g., antacids, laxatives, hypoglycemic agents. The use of many of these drugs may be discovered only in the course of a nutrition assessment. Often these medications are not considered drugs by a pregnant woman.

Many drugs are not included in this section. Either they were beyond the scope of this chapter, their use was not widespread, or they were not specific to the prenatal period (e.g., drugs used in labor and delivery). Drugs not discussed include vaccines and serums, radiologic agents, environmental agents, anti-malarials, anti-gout medications, drugs to prevent premature labor, analgesics and anesthetics used in labor and delivery and drugs involved in G-6-PD deficiency. Vitamins are discussed in **Nutrient Needs During Pregnancy.**

Information for this chapter was primarily obtained from reliable review articles (3,4,6,7,8,9).

Research about the effect of drugs on the fetus is ongoing. Some of this information may be outdated before it is printed. For this reason, listed below are sources of up-to-date information on drugs and pregnancy in the Boston area. Practitioners or pregnant women with questions are encouraged to use these resources. Drug information centers also exist throughout the country.

- Brigham and Women's Hospital - Drug Information Center
- Tufts New England Medical Center
- Massachusetts College of Pharmacy and Allied Health Sciences
- Embryology-Teratology Unit – Shriners Burns Institute, Boston.
- Toll-free information service on environmental exposures in pregnancy: call 1-800-322-5014, M-F, 8:30AM–4:30PM; a service of the Birth Defect Center at the New England Medical Center's Floating Hospital, funded by the Massachusetts Department of Public Health.

ANTIBIOTICS

Antibiotics are considered to benefit the fetus through treatment of maternal infections.However, in cases of suspected newborn infection, use of antibiotics at term may make useful culture and sensitivity difficult to obtain on the newborn. Listed below are selected common antibiotics about which relatively conclusive evidence indicates adverse effects during pregnancy. Many other antibiotics exist. Some have not been studied extensively and little information about their effects during pregnancy is available. For more information, or for information on the numerous other antibiotics not discussed, consult the recommended sources.

Candicidan and miconazole (Monistat) are used topically for the treatment of candidal vaginitis and vulvavaginitis. They should not be used vaginally if membranes have ruptured (7).

Chloramphenicol can result in the gray baby syndrome (vascular collapse) if administered in large doses near term (7). This potentially fatal complication is due to the newborn's inability to excrete chloramphenicol effectively. A child born unexpectedly while the mother is on this drug would be denied the mother's metabolic detoxification ability.

Metronidazole (Flagyl) is used to treat a range of infections including trichomoniasis and vaginitis. Data on use during pregnancy is controversial. Case studies have reported four anomalies among fifty-five patients who used it in the first trimester (7). It is carcinogenic in rodents. It should be avoided and all other therapeutic options attempted.

Nalidixic acid is used in the treatment of urinary tract infections. It should be avoided for at least the first three months of pregnancy (9).

Nitrofurantoin, also used to treat UTI, is not associated with fetal damage in the 2nd or 3rd trimester. Its use near term may be associated with hemolytic anemia in G-6-PD deficiency (9).

Streptomycin and kanomycin have been associated with deafness in offspring when the pregnant woman has had long-term therapy (6,7,10). They should not be administered during the first trimester or in doses exceeding 20 gm (7). Other members of the aminoglycosides (gentamicin, neomycin, amikacin and tobramycin) may also be suspect (9).

Sulfonamides are commonly used to treat urinary tract infections (UTI). However, they tend to disassociate bilirubin from serum albumin. The resulting free bilirubin, if it accumulates in high levels in blood, can diffuse into the central nervous system and lead to kernicterus. Although the fetus can clear free bilirubin, the neonate may not be able to do so. Therefore, if the drug is used near delivery, enough may remain in the newborn's blood to make kernicterus a possibility. For this reason, the sulfonamides should not be administered in the last three months of pregnancy (7). They should also not be used if mother or fetus has G-6-PD deficiency (6,7). Ampicillin is the drug of choice for the treatment of UTI during the last trimester (7).

Trimethoprim is often used in combination with sulfonamides (sulfamethoxazole). In early pregnancy it has been used without apparent increase in anomalies (6).

Tetracyclines should be avoided during pregnancy. Deposited in the teeth of the fetus they cause staining and, in some cases, enamel hypoplasia only evident after tooth eruption in infancy (6,7). Tetracycline may also accumulate in the matrix of bones; in premature infants it has interfered with skeletal growth. Second and third trimester exposure is of the most concern regarding bone and tooth effects. Data of adverse effects in the first trimester is still controversial; bone fluorescence, cataracts and congenital hand defects have been reported.

Penicillins (ampicillin, cephalasporin, methicillin) are most commonly used during pregnancy. They are effective and non-toxic. Patients allergic to this group of antibiotics will require other compounds.

ANALGESICS AND ANTIPYRETICS

Aspirin is often used freely during pregnancy. In the human fetus, the relationship between aspirin and congenital malformations is unclear. Some retrospective studies and case reports indicate mothers who gave birth to malformed infants consumed aspirin more frequently than mothers of normal infants. However, these studies have shortcomings which may invalidate the results (11).

Evidence suggests that taking more than 300 mg (5 grains–1 tablet) aspirin during the week prior to delivery may produce temporary coagulation defects in the newborn (12). Aspirin used late in pregnancy may delay delivery. It may also increase risk of hemorrhage before and after delivery. This risk may persist for more than a week with ingestion of only one tablet. The Food and Drug Administration warns against its use three months before delivery.

Acetominophen (Tylenol) does cross the placenta, but few adverse effects on the fetus have been reported. However, little data exists on its safety. In one case, renal abnormalities appeared in the infant of a mother who took acetominophen every day during pregnancy (7).

Codeine used prenatally is not associated with increased risk of fetal malformations. However,

infants born to mothers who take codeine chronically may experience withdrawal symptoms, indicating some in-utero addition potential.

Ergotamine tartrate, used to prevent migraine headaches, should not be used during pregnancy. It can create uterine contractions and significant increase in maternal blood pressure (7). No studies of its teratogenic effects are available.

Methysergide maleate (Sansert), a semisynthetic derivative of the ergot alkaloids, is also at present considered unsafe for treatment of migraines during pregnancy. It may cause abortion or prematurity. No studies of its effects on the fetus are available (7).

Morphine is used primarily as an analgesic during labor. Infant addiction and subsequent withdrawal may occur after chronic use during gestation.

Pentazocine (Talwin) has been associated with neonatal withdrawal if used for long periods during pregnancy (6).

Phenacetin (Empirin, Fiorinal, Bromo-Seltzer) is usually found in combination with aspirin. For this reason it is not recommended during pregnancy (7).

Propoxyphene (Darvon) has been associated with withdrawal symptoms in infants of mothers who used it for long periods during pregnancy (6).

ANTICOAGULANTS

Anticoagulants decrease the ability of the blood to clot. They prevent harmful clots from forming in blood vessels. They are used to treat pulmonary embolism, venous thromboembolic disease, atrial fibrillation and to prevent clotting in arterial and cardiac surgery.

Heparin does not cross the placenta, and until recently was thought to have no effect on the fetus. Recent evidence indicates that infants born to mothers using heparin may also be at risk (13). Approximately one-fifth of these infants were premature, one-eighth were stillborn, and two-thirds appeared normal.

Warfarin (a coumarin derivative) is an oral anticoagulant. It has been associated with severe fetal anomalies, especially when used in the first trimester. These include nasal hypoplasia and bone deformities. Central nervous system and eye abnormalities may be caused by exposure in the second or third trimester. Abortion, stillbirth and hemorrhagic complications are also associated with coumarin derivatives. A recent study (13) estimated that use of coumarin derivatives during pregnancy results in two-thirds normal infants, one-sixth abnormal infants, and one-sixth abortions or stillbirths.

Inferior vena cava filters may be useful for lower extremity thromboembolic problems, avoiding the use of anticoagulants (14). In all other cases anticoagulants are necessary for maternal survival, and the risks to the newborn should be discussed before pregnancy is attempted.

ANTICONVULSANTS

Most epileptic women need to remain on medications while pregnant. The risks of an epileptic woman on anticonvulsants bearing children with abnormalities appears to be approximately double the risk of normal women. The rate of abnormalities in epileptic women is 4-5% (15).

Cleft palate and lip and congenital heart disease are the main anomalies reported. In addition, a syndrome associated with the use of phenytoin has been described.

At this time, the causes of increased risk are unclear. The epilepsy itself, the drug, the genetic predisposition of the woman, differences in pharmokinetics and drug disposition, or deficiency states in mother or fetus induced by the drug are all possible causes (15).

In general, it can be said that anti-convulsants have a deleterious effect on the metabolism of a number of vitamins and minerals. Blood levels of folic acid in particular need close monitoring. Supplementation is often necessary.

Phenytoin (Dilantin) is associated with the fetal hydantoin syndrome, consisting of growth deficiency, both prenatally and postnatally, microencephaly and mental deficiency (15). Some infants also had other dysmorphic features, including cafe au lait spots, inguinal hernia, metatarsus varus and hypopigmented nevi.

Cleft lip and cleft palate and congenital heart disease have also been associated with epileptic women on anticonvulsants. Whether these abnormalities are the result of the epilepsy or of the drugs is unclear.

Low blood folate levels may develop in pregnant women taking this medication, which has been thought to be the cause of malformations in infants born to these mothers. It is recommended that folic acid blood levels be closely watched in pregnancy, and that folic acid supplementation be given. Phenytoin is also known to lower serum levels of vitamin B_{12}, vitamin B_6, vitamin D, calcium and magnesium. Decreased bone density has been noted. Generous amounts of these nutrients need to be assured in planning diets and recommending supplements (16).

Phenobarbital has been associated with dysmorphic facies, depressed nasal bridge, hypertelorism, ptosis and growth retardation (6). Cleft lip, congenital heart disease and micro-encephaly are also possible results of phenobarbital therapy. If the medicine is taken near term, withdrawal of the neonate and coagulation defects are possible. At present, data are scanty, based on a small number of case reports, and inconclusive (4,5).

Phenobarbital has similar nutritional effects as phenytoin (16).

Carbamazepine is an anticonvulsant used with specialized or complex epileptics. Its risks during pregnancy are unknown (7).

In non-pregnant patients, carbamazepine has been noted to cause nausea, vomiting, gastric distress, abdominal pain, diarrhea or constipation, anorexia, dry mouth, glossitis and stomatitis. Periodic blood levels of folic acid and vitamin B_{12} determinations are recommended (16).

Primidone (6,7) has recently been associated with cleft palate and withdrawal syndrome in the neonate. Abnormal bleeding or serious hemorrhage may occur in infants born to mothers taking primidone during pregnancy. Vitamin K therapy in the last part of pregnancy may be recommended.

Primidone can cause anorexia, nausea and vomiting, and decrease serum levels of folic acid, vitamin B_{12}, vitamin B_6. It also affects vitamin D and calcium metabolism, and has been associated with bone loss (16).

Trimethadione is used in treatment of petit mal. It is rarely used during childbearing years. It has been associated with a trimethadione syndrome including palatal anomalies, V-shaped eyebrows, abnormal ears, epicanthus, and speech difficulties. Fetal risk appears to be greater than 80%. Therapy with ethosuximide is recommended for petit mal (7).

Trimethadione can cause hiccups, nausea, vomiting, abdominal pain, gastric distress, anorexia and weight loss. It has also been implicated in folic acid deficiency in pregnancy (16).

ANTIHISTAMINES/ANTI-NAUSEANTS

Antihistamines relieve or prevent symptoms of hay fever, allergies, colds and motion sickness. They are also commonly used as antinauseants during early pregnancy.

Before antinauseants are used, dietary measures should be attempted (see section on **GI Distress in Pregnancy**). Pyridoxine (vitamine B_6) alone may also be useful in relieving morning sickenss.

Over-the-counter antihistamines include brompheniramine, chlorpheniramine, cyclizine, doxylamine, meclizine, phenindamine, pheniramine, pyrilamine. In a large-scale study of chlorpheniramine, phreniramine and brompheniramine, only brompheniramine was associated with increased teratogenicity (7). Animal studies have shown increased risk with meclizine and cyclizine, but human studies have not substantiated these findings.

Dimenhydrinate (Dramamine) has been associated with increased incidence of prematurity (7).

Diphenhydramine (Benadryl) is used for relief of allergic symptoms. A large retrospective study found no association with teratogenicity. A smaller study found that intake of diphenhydramine was more frequent in mothers of children with clefts (7). For this reason, it should be avoided in the first trimester.

Doxylamine (Bendectin combined with pyridoxine) was the most commonly prescribed antinauseant in this country, until it was voluntarily withdrawn from the market by its manufacturer in mid-1983, after a number of highly publicized lawsuits against the company claiming the drug caused birth defects. The safety of Bendectin has been investigated quite extensively, both in animal studies and epidemiologically, and no consistent association has been found between its use in pregnancy and birth defects (17,18). However, in 1980, before the drug was taken off the market, the FDA had concluded that despite negative findings regarding Bendectin's teratogenicity, a "residual uncertainty" must remain about its safety because it was not possible to prove unequivocably that the drug could never cause birth defects. Some investigators maintain that there is a possibility that Bendectin is a weak teratogen.

Trimethobenzamide (Tigan) is also used for nausea and vomiting in pregnancy. Animal studies have shown no increased risk of malformations of offspring when used in pregnancy, but the safety of the drug for pregnant women has not been established (7).

ANTIHYPERTENSIVES

Diuretics are commonly prescribed for hypertension. The use of diuretics in pregnancy for the treatment of of pre-eclampsia is contraindicated. More information about diuretics is found in **Nutrition and the Hypertensive Disorders of Pregnancy.**

Hydralazine is the drug of choice to control the moderate to severe hypertension of pre-eclampsia (7). Hydralazine is effectively used to treat chronic hypertension only in combination with either

diuretics or propranolol. Since both are controversial during pregnancy, hydralazine is not usually used to treat chronic hypertension.

Methyldopa is the drug of choice for mild to moderate chronic hypertension. A study of 117 women given methyldopa during pregnancy indicated it was safe and effective (7,19).

Thiazide diuretics to control chronic hypertension during pregnancy are controversial, since they may decrease placental perfusion (5). There is no evidence that thiazide will compromise fetal growth. Isolated cases of neonatal thrombocytopenia have been reported with use of thiazides (6).

These three drugs are most commonly used during pregnancy. Other antihypertensive drugs have not been studied enough to recommend for safe use. Some are controversial with adverse effects reported. Some are recommended only in life-threatening or severe hypertensive crises.

ANTINEOPLASTICS

Folic acid antagonists (aminopterin and methotrexate) and alkylating agents are teratogenic.

ASTHMA MEDICATIONS

Theophylline and aminophylline (Aminodur, Elixophyllin, Slo-Phyllin, Somophyllin and Theo-Dur) are currently used to treat asthma. Data on use in pregnancy is limited. One isolated case reports an association between theophylline ingestion and fetal chromosomal abnormalities (7). At present theophylline is the drug of choice for pregnant asthmatics.

Bedomethasone (aerosol glutocortlcoid) is used when bronchodilators are not successful. The effect on the fetus is unknown.

Cromolyn sodium (Aarone, Intal) is used to prevent asthmatic responses when unavoidable exposure to know allergens will occur. It is also used to prevent exercise induced asthma. Very little data is available about the effects on the fetus.

Ephedrine is not used commonly to control asthma during pregnancy, since more effective preparations are available.

Metaproterenal (Alupent) in aerosol form is used to treat infrequent mild asthmatic episodes. It can also be used orally in conjunction with theophylline. No large studies have been done on the effects of this drug on the fetus (7).

Terbutaline (Brethine) is only used when maximum doses of theophylline are not effective (5). No controlled studies have investigated the effects of this drug during early pregnancy. The drug is being investigated for prevention of premature labor.

CARDIOVASCULAR AGENTS

Digoxin is used in treatment of congestive heart failure and atrial fibrillation and in prevention of paroxysmal atrial tachycardia. It does not appear to be teratogenic (7). If used, maternal blood should be monitored often to assure therapeutic levels.

Lidocaine is used in the emergency treatment of ventricular arrhythmias. High blood levels in the mother resulting from doses higher than normal may be associated with neonatal depression and neurobehavioral changes.

Magnesium sulfate is used to prevent seizures in toxemic patients (7). Hypotonia and depression may be seen in the infant after extensive maternal therapy.

Nitrates (amyl nitrate, erythrityl tetranitrate isosorbide dinitrate, nitroglycerine, pentaerythritol tetranitrate) are used to treat angina pectoris. There is no data available on the effects of nitrates on the fetus. Instead bedrest is recommended when possible. Angina pectoris is not usually found in women of childbearing age (7).

Norepinephrine is controversial during pregnancy. Increased uterine contractions and contractions of uterine vasculature (decreasing uterine blood flow) are associated with its use.

Quinidine (Cardioquin, Quinaglute) is an antiarrhythmic drug used in atrial and ventricular arrhythmias (7). Quinine (related to quinidine) is associated with abortion, but quinidine does not appear to have the same properties. Possible problems of quinidine therapy include neonatal thrombocytopenia and eighth nerve damage (7).

Propranolol (Inderal) is used to prevent angina, prevent and treat heart rhythm disorders and to control blood pressure. It has been associated with growth retardation, neonatal hypoglycemia and brachycardia (6,7). It should be used only in life-threatening situations.

COLD/COUGH MEDICATIONS AND DECONGESTANTS

These are popular medications, especially the numerous over-the-counter varieties. These medications include cold and allergy medications, antitussives (cough suppressants) and decongestants.

Cold and allergy medications usually contain antihistamines, decongestants, analgesics and additional ingredients including caffeine, antacids, belladonna, alcohol and benzocaine (an anesthetic) (20). For example, *Contac* contains chlorpheniramine (antihistamine), phenylpropanolamine (a decongestant) and belladonna. *Dristan tablets* contain phenindamine (antihistasmine), phenylephrine (a decongestant), aspirin, caffeine, and aluminum and magnesium antacids.

Antitussives (cough suppressants) usually contain a cough suppressant, a decongestant, an expectorant (which reduces the thickness of phlegm) and miscellaneous other ingredients including antihistamines, alcohol, analgesics and benzocaine (20). For example, ***Robitussin*** contains an expectorant, G. guaiacolate and alcohol. *Nyquil* contains dextromethorphan (an antitussive), ephedrine (an expectorant), doxylamine (an antihistamine), acetominophen and alcohol.

Nasal decongestants (topical) usually contain a decongestant, and an anti-septic, antihistamines and other ingredients including aromatic oils, benzocaine and menthol (20). For example, *Neo-Synephrine drops* contain phenylephrine (a decongestant), benzalkonium chloride (an antiseptic) and various aromatic oils.

Safety of Common Ingredients of Cold/Cough Medications

Evaluation of the safety of these medications during pregnancy is difficult. Most have not been studied extensively, or at all. The following guidelines may be helpful:

1. Avoid these medications if at all possible. Although bothersome, colds and coughs usually pass quickly. Many over-the-counter medications are not effective. Try increased fluids, bed rest and vaporizers.
2. Read ingredients of medications. Although sorting out the ingredients may be difficult, awareness of the numerous components of most medications is sobering. Some ingredients can be easily identified (aspirin, alcohol, caffeine).
3. Avoid medications with aspirin, caffeine and alcohol.
4. Take medications in the smallest dose possible, for the shortest time possible.
5. Use medications with as few ingredients as possible.

The following specific ingredients have been studied in various degrees:

Suppressants include codeine, dextromethorphan, diphenhydramine, camphor and ethyl morphine. Codeine and morphine are discussed on the page with analgesics; diphenhydramine is discussed on the page with antihistamines. Dextromethorphan does not appear to have any adverse effects on the fetus; however, when used chronically in women with impaired renal functions, it may cause respiratory depression in the infant (1). Camphor in excessive amounts theoretically might induce fetal convulsions.

Antihistamines and Analgesics are discussed on previous page.

Decongestants commonly used include ephedrine, phenylephrine, phenylpropanolamine, pseudoephedrine, oxymetazoline, propylhexedrine and xylometazoline, a class of drugs known as sympathomimetics. No data has associated these drugs with congenital anomalies. However, they should be avoided if the patient has hypertension (either essential or in combination with pre-eclampsia) since they have a blood pressure elevating effect. Fetal effects may include hyperactivity, irritability and tachycardia (7).

GASTROINTESTINAL MEDICATIONS

Antacids

There are numerous antacids on the market today. Since heartburn is a common pregnancy complaint, many pregnant women want to take antacids for relief. The common components of antacids are sodium bicarbonate, aluminum hydroxide, calcium carbonate, magnesium hydroxide, magnesium trisilicate and magnesium carbonate. Commercial antacids will contain one or more or these compounds. Ingredients are listed on the package.

Table 7-1. COMMON ANTACIDS

*Sodium bicarbonate	Bromo-Seltzer, Alka-Seltzer
*Aluminum hydroxide	Amphojel
*Calcium carbonate	Pepto-Bismol, Tums
*Magnesium hydroxide	Milk of Magnesia
*Aluminum hydroxide and magnesium hydroxide	Di-Gel, Maalox, Mylanta
*Aluminum hydroxide and magnesium trisilicate	Gelusil, Am-T
*Aluminum hydroxide and sodium carbonate	Rolaids
*Aluminum hydroxide and magnesium hydroxide and magnesium carbonate	Di-Gel tablets

Guidelines for the use of antacids in pregnancy are suggested below.

1. Try dietary and other non-drug measures first.
2. Avoid antacids during the first trimester. One retrospective study has noted an association between ingestion of antacids and increased incidence of fetal abnormalities during the first 56 days of pregnancy (21).

3. Avoid sodium bicarbonate. It is absorbed systemically. The excess sodium may contribute to maternal edema.

4. Choose antacids containing aluminum hydroxide, calcium carbonate, magnesium trisilicate, magnesium carbonate or magnesium hydroxide. These are less well-absorbed systemically.

5. Avoid chronic high doses of *any* antacid. Fetal hypomagnesemia and increased deep tendon reflexes have been reported with chronic use of aluminum hydroxide and calcium carbonate (7). Exposure to high levels of magnesium compounds has been associated with respiratory distress, cardiovascular impairment, decreased muscle tone and hypermagnesemia in the neonate (7).

6. Avoid antacids that contain aspirin.

7. Women with impaired kidney function may have trouble excreting antacids.

8. Antacids may decrease the absorbability of iron if taken at the same time.

9. Significant rebound gastric acidity occasionally occurs with prolonged use of calcium carbonate-containing antacids (e.g. Tums). Therefore they may be ineffective when used chronically.

10. Some antacids contain additional components besides the aluminum, magnesium, and calcium salts listed. Some are often used as anti-flatulant agents (Di-Gel, Mylicon). These contain simethicone. Little information exists on their safety during pregnancy.

Antidiarrheal Medications

Antidiarrheal medications usually contain one or more of the following: (12)

Adsorbents (kaolin, pectin, atta pulgite, activated charcoal. Water and other intestinal contents cling to these compounds. Their effectiveness is not completely proven, but they are not absorbed and appear to be safe during pregnancy.

Astringents (alumina powder, bismuth salts - often in the form of bismuth-subsalicylate, calcium hydroxide, phenylsalicylate and zinc phenolsulfonate) are used because they may cause solidification of protein in the bowel. They are not proven effective. Any salicylates should be avoided.

Belladonna alkaloids (atropine, scopalamine) slow the passage of digestive contents through the intestines. Since these compounds are not present in sufficient amounts in over-the-counter medications to effectively treat diarrhea and their safety during pregnancy is not established (8), other non-absorbable medications should be used.

Opium (as a powder or tincture, as morphine, or as paregoric) slows the passage of liquids through the intestines so more water is absorbed. Opium has been used during pregnancy with no apparent adverse effects since its introduction in 1895 (8). However, it should only be used if absolutely necessary. Because opium is a controlled drug, it is present in very small amounts in over-the-counter medications. These amounts are probably not enough to effectively treat diarrhea.

Common diarrheal preparations include Donnegel, Donnatral, Kaopectate and paregoric. Some require prescriptions; others can be obtained over-the-counter. Pregnant women should not be treating themselves for diarrhea. Diarrheal preparations with non-absorbable compounds (kaolin and pectate) are advisable.

Hemorrhoidal Medications

Hemorrhoids are common during pregnancy. They result from the straining of constipation and from the increased venous pressure and blood stasis of the lower half of the body.

Numerous hemorrhoidal preparations appear on the market, both over-the-counter and prescription. They contain a variety of ingredients including surface anesthetics, vasoconstrictors, antiseptics, astringents and vitamins (20).

Anusol - in suppositories or ointment — is recommended (7). **Anugesic** is controversial because it may cause skin reactions. **Anusol-HC** should be avoided because it contains hydrocortisone acetate, a topical steroid which is absorbed systemically (7).

Many over-the-counter hemorrhoidal preparations are of questionable effectiveness. Treatment of hemorrhoids should include relief from constipation (dietary measures, increased fluid, exercise) and soaking in a hot tub.

Laxatives

Before any laxatives are used, dietary treatment and increased exercise should be recommended. Constipation is quite common during pregnancy and should not be viewed with alarm.

Stool softeners – dioctyl calcium sulfosuccinate, dioctyl sodium sulfosuccinate (brand names include Colase and Pericolase) – soften fecal mass by lower surface tension so water and fats can penetrate. They are absorbed and are potentially damaging to the maternal liver. Fetal affects are unknown (22).

Bulk-forming agents – agar, bran, methycellulose, psyllium and tragacanths (brand names include Metamucil) – are over-the-counter medications that swell in contact with water, forming a mass that promotes peristalsis, decreases transit time and keeps feces soft. They are not significantly absorbed (except psyllium) and appear to be safe during pregnancy.

Stimulant laxatives act on the large intestine

directly. They create more frequent bowel movements by irritating the intestinal lining. Although most of them appear to be safe during pregnancy, their use is inadvisable (at any time) because they create a dependence if used frequently. Contents of these laxatives include aloe, cascara, danthron, senna, bisacodyl and phenolphthalein. Aloe (found in Carter's Little Liver Pills and Nature's Remedy) should be avoided since it may stimulate the fetal intestine and induce passage of meconium. Many of the major laxatives (Ex-Lax, Feen-A-Mint) are stimulant laxatives.

Saline laxatives (magnesium salts, including milk of magnesia, epsom salts, sodium and potassium salts) retain water in the intestines, making stools soft. Magnesium salts should be avoided in pregnancy, especially if the patient has significant cardiovascular or renal disease. In pregnancy, sodium salts should also be avoided.

Podophyllum resin (not commonly used) should not be used since it is severely irritating to the small intestine. It may result in hypokalemia and dehydration in mother and fetus (1).

Mineral oil is a stool softener. It should not be used because it may decrease the absorption of fat-soluble vitamins. The resulting reduced vitamin K may lead to hypoprothrombinemia and postpartum hemorrhage (1,7).

HORMONES

Sex

Androgens and progestins (male sex hormones) can masculinize the female fetus. They should be avoided throughout pregnancy (7).

Diethylstilbestrol (DES) –a non-steroidal hormone – used during pregnancy increases the risk of female offspring developing a form of vaginal cancer. Male offspring have an increased incidence of genitourinary anomalies (6).

Estrogens and oral contraceptives are contraindicated during pregnancy. Their use during the first three months may increase the risk of birth defects, although this evidence is based on poor retrospective associations.

Because estrogens and progesterones are used in oral contraceptives, a woman who becomes pregnant (or who thinks she may become pregnant) while taking oral contraceptives should consult a physician or obstetrician immediately. Women who discontinue the Pill in the hope of becoming pregnant should wait at least three months before attempting to conceive, and should use another method of contraception during the waiting period. Some studies indicate that a fetus conceived immediately after discontinuance of the Pill may have a higher risk of birth defects; this is still controversial.

Steroid

Corticosteroids (dexamethasone, hydrocortisone, methyl prednisone and prednisone) are used for relief of inflammation, and for many other purposes. An evaluation of the administration of steroids showed a low incidence of fetal complications. However, they have been associated with cleft palate (1%), stillbirths, decreased fetal growth and placental function (6,7).

Corticosteroids may be the only agents to control maternal asthma, although they are not the drug of choice. If necessary, prednisone should be used since it has the poorest placental transport (7).

Infants born to mothers who took corticosteroids during pregnancy should be observed for signs of hypoadrenalism.

Corticosteroids have been used recently to prevent respiratory distress syndrome (RDS) in the neonate. They are administered prenatally in mothers delivering before 34 weeks.

HYPOGLYCEMIC AGENTS

Oral hypoglycemics [sulfonylureas: tolbutamide (Orinase), chlorpopamide (Diabinese), acetohexamide (Dymelor), and tolazamide (Tolinase)] administered orally for control of blood glucose in mild diabetes, are not recommended during pregnancy.

These drugs cross the placenta and achieve high circulating concentration in the fetus. They are metabolized slowly by the fetal liver; their hypoglycemic effect may persist in the infant for several days after delivery. As a result, the neonate may require therapy with intravenous glucose, and in some cases, exchange transfusions to accelerate the elimination of the active drug.

Insulin is used for blood glucose control during pregnancy. It does not cross the placenta to any significant degree and more precise control of blood glucose may be achieved by minor insulin variations.

PSYCHOTHERAPEUTICS

Antidepressants – amitriptyline (Elavil), desipramine (Norpramin), dexepin (Sinequan(, imipramine (Tofranil), nortiptyline (Aventylk), Pamelor) and protriiptyline (Vivactil) – have not been studied extensively. Their use has been associated with congenital malformations and withdrawal in the neonate, although data is controversial.

Chlordiazepoxide (Librium) and meprobamate (Miltown) have been associated with cardiovascular malformations (6).

Diazepam (Valium) taken during early pregnancy may increase the risk of cleft lip or cleft palate. Chronic usage during pregnancy may cause withdrawal symptoms in the neonate (6). Taken close to delivery (even in moderate doses) it has been associated with apnea, hypotonia, hypothermia, reluctance to feed and impaired response to cold stress in the neonate.

Haloperidol (Haldol), used in the treatment of psychosis, has been implicated in increased limb anomalies when used in the first trimester (6).

Lithium should not be used in the first trimester. A five-year study of women on lithium during pregnancy showed 10% of the infants had malformations (7). Infants born to mothers taking lithium during pregnancy may exhibit neonatal intoxication. Symptoms include cyanosis, lethargy, jaundice, poor sucking, low Apgar scores and neonatal goiter.

Phenothiazines (Thorazine, Stelazine, etc.) cross the placenta. Athough a review of 6,000 pregnancies showed no increased incidence of malformations in offspring with the use of chloropromazine, anecdotal reports suggested various effects including extrapyramidal effects, chromosomal anomalies, agitation and depression (7). They may also be associated with the development of ileus (severe constipation) and bowel rupture in the newborn (22).

Thiothixene (Navane), a strong anti-psychotic, has not been investigated. It should be avoided for at least the first three months of pregnancy (8).

SLEEP AIDS AND SEDATIVES

Barbiturates (Butabarbitol, phenobarbital, butalbital) are used to treat sleeplessness, as well as epilepsy and pre-eclampsia in pregnancy. They calm excited or tense patients. They also are used to control asthma.

As sleep medications, they may be abused and overused. Barbiturates produce physical dependence. Withdrawal symptoms can be seen in infants even after low maternal doses. (See section on **Anticonvulsants** for more information).

Barbiturates cross the placenta and may accumulate in the fetal liver. Since they stimulate metabolic enzyme systems, they can be used prenatally to prevent hyperbilirubinemia.

Use of barbiturates in pregnancy may be associated with hemorrhage in the newborn due to reduced levels of vitamin K-dependent clotting factors.

Chloral hydrate (Noctec) and ethchlorvynol (Placidyl) are also used to treat sleeplessness. The effects of their use during pregnancy have not been studied. Chloral hydrate is known to cross the placenta.

Sedatives cannot be considered safe during pregnancy. Most produce sedation and symptoms of withdrawal in the neonate. They should not be used unless medically required for epilepsy or pre-eclampsia.

Over-the-counter products (brand names include Compoz, Excedrin P.M., Nytol, Sominex) contain antihistamines as well as numerous other ingredients including scopolamine, aspirin or salicylates and acetominophen.

Although a product containing *only* one or two antihistamines may be safe, none of these are recommended during pregnancy. Scopolamine and aspirin are inadvisable.

Sleeplessness and tension are pervasive in our society. Their source is not always determinable; cures may not be easily found. However, relief with over-the-counter medications is unlikely and other approaches should be used.

THYROID MEDICATIONS

Antithyroid drugs (propylthiouracil and methimazole) are used to reverse hyperthyroidism. Used in the last trimester, they have been associated with fetal death, fetal goiter, fetal hypothyroidism and congenital abnormalities. They should be used at minimum doses (9).. In minimal doses they may allow women with Grave's disease (hyperthyroidism) to complete their pregnancies successfully.

Iodides in pharmacological doses may result in fetal goiter (7). Locally destructive effects on the fetal thyroid gland (or its complete absence) are also possible.

Thyroid is used to correct thyroid deficiency of the mother and to treat goiter and thyroid cancer. The thyroid hormone does not cross the placenta and so is safe to use during pregnancy when medically indicated.

WEIGHT CONTROL

Amphetamines and phenmetrazine (Preludin) are used as appetite suppressants. Aside from possible anomalies in infants and side effects in the mother, they have no place in therapy during pregnancy since weight control is contraindicated. An addiction potential also exists.

DRUGS RELATED TO LIFESTYLE AND CULTURE

Alcohol

Research during the past several years has shown that women who drink heavily during pregnancy have a greater risk of producing children with physical malformations, neurologic abnormalities,

Table 7-2. MOST CONSISTENT FEATURES OF THE FETAL ALCOHOL SYNDROME

Growth and Performance

- Prenatal onset growth deficiency, more pronounced in length than in weight
- Concomitant microcephaly (small head circumference) even when corrected for small body weight and length
- Postnatal growth deficiency in weight and length usually below 3rd percentile
- Delay of intellectual development and/or mental deficiency (mean IQ from Seattle study = 64, range 16-92)
- Fine motor dysfunction (poor coordination)

Head and Face

- Microcephaly
- Short palpebral fissures (narrow eye slits)
- Midfacial (maxillary) hypoplasia (underdevelopment of midfacial region)
- Flattened, elongated philtrum (middle of upper lip) associated with thin, narrow vermilion lip borders (highly specific to FAS)
- Minor ear anomalies including low set ears

Limbs

- Abnormal creases in the palm of the hand
- Minor joint anomalies
  - -syndactyly (fingers or toes joined together)
  - -clinodactyly (abnormal bending of fingers or toes)
  - -camptodactyly (one or more fingers constantly flexed at one or more phalangeal joints)

Heart

- Ventricular and atrial septal defect (valve defects)

Brain

- Absence of corpus callosum
- Hydrocephalus (excess fluid in cranium)
- Brain cell migratory abnormalities

Other

- Minor genital anomalies
- Hemangiomas (benign tumors made up of blood vessels) in infancy

Reproduced with permission from Jones, Kenneth, and Smith, David. The fetal alcohol syndrome. Teratology. 12(1): 1-10, 1975.

and developmental problems than moderate or non-drinking women. This phenomenon is known as the Fetal Alcohol Syndrome (FAS). The number of children affected by this syndrome is unknown, although some researchers now believe that FAS may be the third most common cause of mental retardation.

In addition to retarded intellectual development, children born with FAS may experience delayed physical development. They may be below average in birth weight and length, and they do not seem to "catch up" despite proper care and nutrition after birth. The head circumference of the FAS baby may also be smaller than average, indicating that the brain is smaller than normal. Facial, limb and heart abnormalities may also be present.

Alcohol is known to readily cross the placenta. The alcohol passes from the maternal circulation to the fetus in approximately the same concentration as in the mother. The undeveloped liver of the unborn baby can burn up alcohol at less than half the rate of an adult liver, which means that alcohol remains in the fetal system longer than in the adult system. Studies have shown that a high blood alcohol level during a critical time of embryonic development may be the decisive factor in producing Fetal Alcohol Syndrome. The average alcohol consumption may not be as important as the maximum concentrations obtained during binge drinking at critical periods of fetal growth or development.

It is not clear whether alcohol acts as a direct toxin or via its metabolites, or whether other factors must be present to produce abnormalities. The quantity and variability of alcohol consumption during the various stages of pregnancy in women may have different effects. Heavy drinking during the first trimester probably has the greatest effect on fetal physical development. During the second and third trimester fetal brain development may be affected. During these later two trimesters heavy alcohol consumption may have a greater effect on fetal size.

So far, the effects of the Fetal Alcohol Syndrome have only been documented in the children of heavy-drinking women. In the studies done at the Boston City Hospital, a heavy drinker was defined as a person who consumed five or more drinks on occasion with an average consistent daily intake of 1.5 ounces of pure alcohol.

Ongoing research has yet to make clear whether moderate drinking also may have some harmful

effect on unborn children. In animals, relatively low levels of alcohol have produced offspring with impaired learning ability (23), although they were morphologically normal.

The risk from drinking less than 1 oz. daily of absolute alcohol appears to be low. However, some data indicates that consumption of 1 oz. pure alcohol daily in late pregnancy is associated with decreased birth weight (24). Consumption of one to two ounces alcohol in early pregnancy has been associated with infants' altered growth and morphogenesis (24). In any event, drinking 3 oz. or more of pure alcohol daily [5–6 mixed drinks, or 6 beers, or 6 (4-oz.) glasses of wine] represents a high risk. Binges should be avoided (24).

Table 7-3. PURE ALCOHOLIC CONTENT OF ALCOHOLIC BEVERAGES

Hard Liquor	Amount	Pure Alcohol
Rum, vodka, gin, scotch, whiskey*		
(80 proof)	1 oz.	.4 oz.
(100 proof)	1 oz.	.5 oz.
Mixed drink*	1 jigger-	
(100 proof)	(1½ oz.)	.6 oz.
Beer	12 oz.	.5 oz.
Wine	4 oz.	.5 oz.

*The alcohol content of mixed drings varies from 1–2 jiggers or 1½–3 ounces liquor. Hard liquor may be 80, 86, 90, 94, or 100 proof. Pure alcohol content is 50% of the proof. For example, 86-proof liquor is 43% alcohol.

Since no one yet knows how much alcohol is too much during pregnancy, it is recommended that pregnant women be counseled against drinking any alcohol during pregnancy. If a heavy drinker stops or cuts down on drinking, the risks to the baby are reduced.

In 1981, the Surgeon General advised all pregnant women, and those considering becoming pregnant, not to drink alcoholic beverages. He urged health care providers to routinely ask such patients about alcohol consumption and to enter this information in the medical record. Finally, he stated that every patient should be informed about the risks of alcohol in pregnancy and advised not to drink alcoholic beverages.

Smoking

Women who smoke tend to have lower birth-weight babies than non-smokers; the more the mother smokes, the smaller her baby is likely to be. Smoking during pregnancy is associated with a reduction in birthweight on the average in range of 150-250 gms. This effect has been consistently seen over the past 20 years, despite the fact that the tar and nicotine content of cigarettes has been reduced. The accumulated data of numerous studies show that smoking tends to lower birth weight regardless of social class, age or ethnic background.

Women who smoke also have a greater incidence of premature delivery, spontaneous abortions, stillbirth and neonatal death (25,26,27). There is also evidence of impaired physical and intellectual development in children of women who smoke during pregnancy (28).

The nicotine in cigarette smoke acts on the sympathetic ganglia and the adrenal medulla to release acetylcholine, epinephrine and norepinephrine. Increased levels of these hormones result in increased maternal heart rate, vasoconstriction and increased blood pressure. Vasoconstriction of placental and fetal arteries can result in descreased blood supply, and consequently decreased oxygen and nutrients to the fetus.

Increased levels of carbon monoxide in both mother and fetus are another result of smoking. Carbon monoxide and hemoglobin combine to form carboxyhemoglobin. The increase in carboxyhemoglobin in the mother reduces the amount of oxygen carried by hemoglobin. There is a negative correlation between birth weight and carbon monoxide levels in the mother. Anemic women are at even greater risk if they smoke heavily.

The increase in carbon monoxide levels and vasoconstriction of maternal and fetal blood vessels both decrease the oxygen carrying capacity of blood. These two factors most probably contribute to the lower birth weights seen in the infants of mothers who smoke cigarettes.

Placenta praevia, abruptio placenta, and rupture of membranes are also more prevalent in smoking women. Cigarette smoke is directly related to arterial damage, probably causing these problems. The exact mechanism is not known; carbon monoxide may be involved. Recent evidence indicates that even women who smoke before pregnancy but quit when they become pregnant have increased incidence of placenta praevia and large areas of dead tissue on the placenta. This evidence suggests that women should never start to smoke or at least stop smoking at some earlier point in their lives to eliminate the effects of smoking on fetal outcome.

There is now some evidence that some specific anomalies (inguinal hernia and strabismus) appear more frequently in the male offspring of heavy smokers (20 or more cigarettes daily) (29).

In the past, it had been thought that pregnant smokers experienced anorexia, leading to lower

Brands below 17.6 mgs Tar and 1.2 mgs Nicotine
Source - Federal Trade Commission, 1985

BRAND	TYPE	TAR (mg/cig.)	NICOTINE (mg/cig.)
Carlton	King Size; Filter; (Hard Pack)	<0.5	<0.05
Carlton 100	100MM; Filter; Menthol; (Hard Pack)	<0.5	<0.05
Now	King Size; Filter; (Hard Pack)	<0.5	<0.05
Benson & Hedges	Reg. Size; Filter; (Hard Pack)	1	0.1
Carlton	King Size; Filter; Menthol	1	0.1
Carlton 100	100MM; Filter (Hard Pack)	1	0.1
Kool Ultra	King Size; Filter; Menthol	2	0.1
Now	King Size, Filter	1	0.1
Now	King Size; Filter; Menthol	1	0.1
Iceberg 100	100MM; Filter; Menthol	4	0.3
Kent III	King Size, Filter	3	0.3
Now 100	100MM; Filter	3	0.3
Triumph	King Size; Filter	3	0.3
Benson & Hedges Ultra Light	100MM; Filter (Hard Pack)	5	0.4
Carlton 100	100MM; Fiher	5	0.4
Doral II	King Size; Filter	4	0.4
Kent III 100	100MM; Filter	4	0.4
Kool Ultra 100	100MM; Fiher; Menthol	4	0.4
Merit Ultra Lights	King Size; Filter; Menthol	5	0.4
Merit Ultra Lights 100	100MM; Filter; Menthol	4	0.4
Salem Ultra	King Size; Filter; Menthol	5	0.4
Salem Ultra 100	100MM; Filter; Menthol	5	0.4
Tareyton Lights	King Size; Fiher	4	0.4
Triumph 100	100MM; Filter	4	0.4
True	King Size; Filter	5	0.4
Vantage Ultra Lights	King Size; Fiher	5	0.4
Winston Ultra Lights	King Size; Filter	5	0.4
Bright	King Size; Filter; Menthol	6	0.5
Merit	King Size; Filter	8	0.5
Vantage Ultra Lights 100	100MM; Filter	5	0.5
Winston Ultra Lights 100	100MM; Filter	5	0.5
Belair 100	100MM; Filter, Menthol	8	0.6
Carlton 120	120MM; Filter	7	0.6
More Lights 100	100MM; Filter; (Hard Pack)	8	0.6
Pall Mall Extra Light	King Size; Filter	7	0.6
Parliament Lights	King Size, Filter (Hard Pack)	9	0.6
Tareyton Long Lights 100	100MM; Filter	7	0.6
True 100	100MM; Filter	8	0.6
True 100	100MM; Filter; Menthol	7	0.6
Virginia Slims Lights 100	100MM; Filter; (Hard Pack)	8	0.6
Belair	King Size; Filter; Menthol	10	0.7
Benson & Hedges Lights 100	100MM; Filter; Menthol	10	0.7
Camel Lights	King Size; Filter; (Hard Pack)	9	0.7
Camel Lights	King Size; Filter	8	0.7
Century Lights	King Size; Filter	9	0.7
Kent Golden Lights Menthol	King Size; Filter; Menthol	8	0.7
Kool Lights	King Size; Filter; Menthol	8	0.7
Kool Milds	King Size; Filter; Menthol	10	0.7
L&M Lights	King Size; Filter	8	0.7
Marlboro Lights	King Size; Filter	10	0.7
Marlboro Lights 100	100MM; Filter	10	0.7
Merit 100	100MM; Filter	10	0.7
Newport Lights	King Size, Filter; Menthol	8	0.7
Pall Mall Light 100	100MM; Filter	9	0.7
Raleigh Lights 100	100MM; Filter	9	0.7
Salem Lights	King Size; Filter; Menthol	9	0.7
Salem Slim Lights 100	100MM; Filter; Menthol; (Hard Pack)	8	0.7
Vantage	King Size; Filter	10	0.7
Vantage 100	100MM; Fiher	9	0.7
Viceroy Rich Lights	King Size; Fiher	10	0.7
Winston Lights	King Size; Filter	8	0.7
Camel Lights 100	100MM; Filter	11	0.8
Kent Golden Lights	King Size; Fiher	9	0.8
Kool Milds 100	100MM, Filter; Menthol	11	0.8
L&M Lights 100	100MM; Filter	8	0.8
Lucky Strike	King Size; Filter	10	0.8
MultiFilter	King Size; Filter	12	0.8
Newport Lights 100	100MM; Filter; Menthol	10	0.8
Old Gold Lights	King Size; Filter	9	0.8
Parliament Lights 100	100MM; Filter	12	0.8
Players	King Size; Filter	12	0.8
Raleigh Lights	King Size, Filter	10	0.8
Satin 100	100MM; Filter; Menthol	9	0.8
Viceroy Rich Lights 100	100MM; Filter	11	0.8
Winston Lights 100	100MM; Filter	11	0.8
Alpine	King Size; Filter; Menthol	16	0.9
Century	King Size; Filter	14	0.9
Dorado	King Size; Filter	13	0.9
Eve Lights 100	100MM, Filter	12	0.9
Galaxy	King Size; Filter	14	0.9
Kent	King Size; Filter	12	0.9
Kool Super Longs 100	100MM; Filter; Menthol	14	0.9
L&M	King Size; Filter	13	0.9
Lark	King Size; Filter	14	0.9
Lark Lights	King Size; Filter	13	0.9
Lucky Strike 100	100MM; Filter	11	0.9
Newport Red	King Size; Filter; (Hard Pack)	12	0.9
Players 100	100MM; Filter; Menthol; (Hard Pack)	13	0.9
Raleigh	King Size; Filter	15	0.9
Saratoga 120	120MM; Filter; (Hard Pack)	14	0.9
Satin 100	100MM; Filter	10	0.9
Silva Thins 100	100MM; Filter; Menthol	11	0.9
Tareyton	King Size; Filter	13	0.9
Tareyton 100	100MM; Filter	13	0.9
Viceroy	King Size; Filter	16	0.9
Viceroy Super Long 100	100MM; Filter	14	0.9
Virginia Slims 100	100MM; Filter	14	0.9
Benson & Hedges 100	100MM; Filter; Menthol; (Hard Pack)	16	1.0
Benson & Hedges 100	100MM; Filter	16	1.0
Kent 100	100MM; Filter	13	1.0
Kool	King Size; Filter; Menthol	16	1.0
L&M 100	100MM; Filter	14	1.0
Lark 100	100MM; Filter	15	1.0
Lark Lights 100	100MM; Filter	13	1.0
Marlboro	King Size; Filter	16	1.0
Marlboro 100	100MM; Filter	16	1.0
Montclair	King Size; Filter; Menthol	15	1.0
Newport Red	King Size; Filter	14	1.0
Pall Mall Light 100	100MM; Filter; Menthol	12	1.0
Picayune	Reg. Size; Non-Filter	16	1.0
Raleigh 100	100MM, Filter	16	1.0
Richland	King Size, Filter; Menthol	15	1.0
Benson & Hedges	King Size; Filter; (Hard Pack)	15	1.1
Camel	King Size; Filter; (Hard Pack)	16	1.1
Eve Lights 120	120MM, Filter; Menthol, (Hard Pack)	14	1.1
Kool	King Size; Filter; Menthol; (Hard Pack)	16	1.1
Newport	King Size; Filter; Menthol; (Hard Pack)	16	1.1
Pall Mall	King Size, Filter	17	1.1
Pall Mall 100	100MM, Filter	15	1.1
Philip Morris International	100MM, Filter (Hard Pack)	17	1.1
Richland	King Size, Filter	16	1.1
Salem	King Size; Filter; Menthol	16	1.1
St. Moritz 100	100MM, Filter	14	1.1
Winston	King Size; Filter (Hard Pack)	16	1.1
Winston International 100	100MM, Filter; (Hard Pack)	16	1.1
Kent 100	100MM, Filter; Menthol	15	1.2
More 120	120MM, Filter	17	1.2
More 120	120MM; Filter; Menthol	16	1.2
Newport	King Size, Filter; Menthol	17	1.2
Salem 100	100MM; Filter; Menthol	16	1.2
Winston 100	100MM, Filter	17	1.2

caloric intake and lower weight gain, and that this factor accounted for the decrease in birth weight seen in their infants. However, several recent studies, indicate that smokers actually eat more than non-smokers in pregnancy even though their weight gain tends to be lower. It is hypothesized that nicotine may increase heat loss from the body causing a number of metabolic changes, thus decreasing the efficiency of utilization of energy. Increasing the caloric intake of pregnant smokers still further may compensate to some extent for the effects of smoking on weight gain and birth weight (29,30).

The effects of cigarette smoking are dose-related. Although many women may find it difficult to quit smoking entirely, the nutritionist or other health practitioner can make some suggestions to reduce the harmful effects of smoking (28).

Table 7-4. SUGGESTIONS FOR PREGNANT SMOKERS

1. Cut down on the number of cigarettes smoked.
2. Switch to a brand with less tar and nicotine.
3. Take fewer puffs on each cigarette.
4. Inhale less deeply.
5. Use a waterpik - a device on the market which cuts down on tar and nicotine.

Obviously, quitting completely is best. There are many programs designed to help people stop smoking. Women concerned about their smoking may want to be referred to one of these programs.

Caffeine

Caffeine is one of the several xanthine derivatives which occur naturally in coffee beans, tea, chocolate and cola. Caffeine is used as a stimulant. It is also used in combination with many drugs. In pregnant women, caffeine enters the bloodstream of the fetus in the same concentration as found in the mother's blood.

Recent studies have shown that rats fed the amount of caffeine found in 3-4 cups of coffee per day produced offspring with more birth defects than average. High caffeine intake in animals has also been related to a higher-than-expected incidence of fetal loss (8).

The question of the possible ill effects of caffeine on human reproduction, such as decreased fertility, miscarriage, prematurity, low birth weight, stillbirth and birth defects, remains controversial (31-37). Existing studies are generally considered inconclusive because of various methodological problems. Some studies seem to suggest possible associations and others do not. As yet, no direct cause and effect relationship between high caffeine intakes and birth

Table 7-6. CAFFEINE IN BEVERAGES AND MEDICATIONS (per tablet)

Beverages and Foods	Amount Caffeine
coffee (6 oz.) (brewed)	75-155 mg - drip coffee in high range, percolator in low range.
instant coffee (6 oz.)	66 mg
tea (6 oz.)	28-44 mg
colas (12 oz.)	32-65 mg
cocoa (6 oz.)	5 mg+
milk chocolate (1 oz.)	6 mg
baking chocolate (1 oz.)	25 mg

Prescription Medications	Amount Caffeine
Cafergot and Migralam capsules	100 mg
Darvon compound	32.4 mg
Fiorinal	40 mg
Migral Tablets	50 mg

Weight Control Aids	Amount Caffeine
Bio Slim T Capsules	140 mg
Dexatrim and Dexatrim Extra Strength	200 mg
Dietac Capsules	200 mg
Hungrex Plus	66 mg
Prolamine	140 mg
Slim One Capsules	200 mg

Alertness Tablets	Amount Caffeine
No Doz	100 mg
Vivarin	200 mg

Analgesic/Pain Relief	Amount Caffeine
Anacin Analgesic Tablets	32 mg
Anacin Maximum Strength	32 mg
Anacin-3 Tablets	32 mg
Cope	32 mg
Excedrin	64.8 mg
Goody's Headache Powders	32.5 mg
Midol	32.4 mg
Stanback Analgesic Powders	15 mg
Vanquish	33 mg

Diuretics	Amount Caffeine
Herbal Diuretic Tablets	16.2 mg
Permathene H2Off	200 mg

Cold/Allergy Relief	Amount Caffeine
Cenegesic	15 mg
Coryban-D	30 mg
Dristan A-F Decongestant Tablets	16.2 mg
Dristan Decongestant Tables	16.2 mg
Duradyne-Forte	30 mg
Euphenex	15 mg
Hista-Compound No. 5	32.5 mg
Midran Decongestant	32.5 mg
Neo-Synephrine Compound	15 mg
Sinapils	32.4 mg
Super-Decon	32 mg
Triaminicin	30 mg

Source: Drug Store News, Nov. 10, 1980, p. 5.

defects or poor pregnancy outcomes has been conclusively demonstrated.

However, in 1980, and again in early 1984, the Food and Drug Administration warned pregnant women to stop or minimize the consumption of caffeine-containing beverages, foods and drugs.

Saccharin

Saccharin, used as a sweetener in many "diet" foods and drinks may be a weak carcinogen although the evidence is not clear-cut. Studies show increased risk of bladder cancer, particularly in males who ingest saccharin.

Animal studies do not show an increased risk of abnormalities with an ingestion of saccharin during pregnancy. However, a study on monkeys demonstrated that saccharin crosses the placenta and that fetal clearance is slow. Saccharin consumed several times daily may accumulate in the fetus. For this reason many clinics counsel against consumption of saccharin during pregnancy (38).

Marijuana and LSD (D-Lysergic Acid Diethylamide)

Studies do not conclusively indicate harmful effects of marijuana on the human fetus. Marijuana may impair cellular-mediated immunity and adversely influence the regulatory function of the fetus hypothalamus. Studies in both animals and humans indicate possible teratogenesis (39). In addition, the drug may be mutagenic. Because of these possible problems, the American Academy of Pediatrics recommends that women who are pregnant or who may become pregnant refrain from smoking marijuana (4).

Table 7-7. COFFEE SUBSTITUTES

Moderation in the use of coffee substitutes may be as important as moderation in the use of coffee itself.

Decaffeinated Coffee

- Solvents used to remove caffeine – trichloroethylene (TCE) and methylene chloride – produce cancer and tumors, respectively, in laboratory animals.
- Steam removal of caffeine appears safe; steam-processed coffee, which is mainly a European import, is expensive and not widely available; food specialty stores and "health food" stores may carry it.
- Studies have shown that decaffeinated coffee produces as much gastrointestinal irritation as regular coffee.

Grain-based Beverages

- Postum brand is available in supermarkets and contains bran, wheat and molasses; it has 12 calories per cup.
- Other brand names available from "health food" stores: Cafix, Pero, Wilson's Heritage.
- Large amounts may cause diarrhea and flatulence.

Herbal Teas

- Some herbal teas contain biologically active substances and have drug effects. However, because herbal teas are sold as food, they are not subject to Federal drug relations.
- The amounts of active chemicals in herbal teas are highly variable, depending on the conditions of growth of the plant, the part of the plant used, and how long the material is brewed. Herbal teas may also contain impurities.
- Herbal teas, once "health food" store items, are now mainstream beverages, widely advertised and available in supermarkets.
- Some women believe herbal teas to be particularly beneficial in pregnancy, and may consume large amounts of them.
- Herbal teas with the following ingredients should be avoided:
  - Alfalfa (contains saponing which disrupts digestion, respiration)
  - Aloe (cathartic)
  - Buckthorn (cathartic)
  - Burdock root (atropine – like action)
  - Camomile (allergenic)
  - Catnip (nervous system toxin)
  - Comfrey (alkaloids toxic to the liver)
  - Dockroot (cathartic)
  - Equisetum (fatal poison)
  - Ginseng (produces high blood pressure)
  - Goldenrod (allergenic)
  - Horsetail (fatal poison)
  - Hydrangea (nervous system toxin)
  - Indian Tobacco (fatal poison)
  - Jimsonweed (nervous system toxin)
  - Juniper (nervous system toxin)
  - Lobelia (nervous system toxin)
  - Marigold (allergenic)
  - Mistletoe (fatal poison)
  - Nutmeg (nervous system toxin)
  - Peppermint (carcinogenic)
  - Poke root (vomiting, diarrhea)
  - Sassafras (carcinogenic)
  - Senna (cathartic)
  - Shave grass (fatal poison)
  - St.-John's-Wort (allergenic)
  - Wormwood (nervous system toxin)
  - Yarrow (allergenic)

Adapted from Brody, J. **Jane Brody's Nutrition Book.** W.W. Norton & Co., N.Y., 1981 and Brody J. **The New York Times Guide to Personal Health,** Avon Books, N.Y., 1982.

LSD has been implicated in chromosomal damage leading to reproductive problems and to a higher incidence of congenital anomalies in infants of mothers who ingested LSD during pregnancy.

In animals, studies have produced conflicting results. Some studies have demonstrated evidence of chromosomal damage and of teratogenesis. Other studies have not confirmed these results.

Human studies are also inconclusive. Some studies conclude that LSD has no apparent effect, while others demonstrate a greater-than-expected incidence of congenital anomalies in infants whose mother ingested LSD (4).

Since LSD ingestion often goes hand-in-hand with ingestion of other street drugs, inadequate nutrition and general poor health, isolation of the effects of LSD is difficult. However, the possible problems caused by LSD should encourage avoidance during pregnancy.

Heroin and Methadone

Amenorrhea and subfertility are common among heroin addicts; however, pregnancy may occur during withdrawal periods. Infants born to mothers addicted to heroin are at risk for hepatitis, in-utero growth retardation and greater perinatal mortality and morbidity (4). Nearly 50% of infants born to an addicted mother weigh less than 2500 gm at birth (6). Infants usually experience heroin withdrawal 24-72 hours after birth, depending on dose and time of last use in relation to delivery.

Mothers addicted to heroin while pregnant are more likely to be in poor health and malnourished. Contaminated needles may cause septic complications; overdose is always a possibility (4).

Pregnant woman maintained on methadone may be less subject to the common dangers of heroin addiction. Their infants tend to be lower birth weight than normal and are also subject to withdrawal syndrome after birth (4). The withdrawal is later (2-4 weeks) and more severe than heroin withdrawal.

Cocaine

Information on the effects of cocaine on the fetus is limited, as cocaine until recently was erroneously thought to be non-addictive and free from side effects. The few known associations of prenatal cocaine use commonly occur later in pregnancy and include abruptio placentae leading to fetal death, premature delivery, and still birth. In the first trimester, women have an increased risk of spontaneous abortions. Behavioral effects to the newborn, which last through the first three months of life, are characterized by hypertonicity (fine tremors), irritability, and problems with focusing in response to vocal and tactile stimulation. Cocaine use is also associated with an increased risk for Sudden Infant Death Syndrome (SIDS) (41,42,43). The incidence of SIDS in babies born to mothers on cocaine is 15% compared to 0.4% in the general population and 4% among heroin users (43).

Reports of renal anomalies and in utero fetal strokes associated with cocaine use require further investigation (42). It has been suggested that even a single use of cocaine prenatally can lead to prematurity, severe birth defects, poor development and sometimes death (43). More information, however, is needed to clarify the effects that the dosage and duration of cocaine use have on the fetus. As cocaine increases in popularity, regardless of socioeconomic status, emphasizing education on the risks to the fetus and avoidance during pregnancy becomes essential.

Table 7-8. DRUGS RELATED TO LIFE-STYLE AND CONTEMPORARY CULTURE

THERAPEUTIC CLASS	GENERIC NAME AND COMMON OR STREET NAMES	ROUTE OF ADMINISTRATION	PLACENTAL TRANSFER	EFFECT ON FETUS*
Stimulant	Caffeine (coffee, tea, cola-flavored drinks)	Orally	+	Miscarriage, prematurity, LBW, stillbirth, birth defects (7,24,25); malformation in mice (40)
	Amphetamines Pep pills, bennies, wake-ups, eye openers, lid poppers, copilots, truck drivers, peaches, roses, hearts, cartwheels, whites, coast to coast, LA turnabouts, browns, footballs, greenies, bombido oranges, dexies, jolly beans, A's, jellie babies, sweets, beans, uppers	Orally; injection	+	Increase in fetal anomalies and malformations: withdrawal syndrome in newborn after chronic maternal use (3,12,17,20).
	Methamphetamine Speed, meth, splash, crystal, bombita, methadrine, doe	Orally; injection	+	
	Other stimulants Pep pills, uppers	Orally; injection	+	
	Cocaine The leaf, snow, c, cecil, coke, dynamite, flake, speedball (when mixed with heroin), girl, happy dust, joy powder, white girl, gold dust, corine, bernies, burese, gin, bernice, stardust, carrie, cholly, heaven dust, paradise	Injection; sniffed	+	Unknown
Sedative	Nicotine (tobacco)	Smoking	+	Small-sized infants, increased perinatal mortality 8,13,15,27
	Barbiturates Yellow, yellow jackets, nimby, nimbles, reds, pinks, red birds, red devils, seggy, seccy, pink ladies, blues, blue birds, blue devils, blue heavens, red and blues, double trouble, toojes, christmas trees, phennies, barbs	Orally; injection	+	Influence on human embryo uncertain; may produce neonatal withdrawal syndrome 17,22,23
Depressant	Alcohol (beer, wine, whiskey)	Orally	+	Fetal malformation and developmental delay, "fetal alcohol syndrome" 10,11,18
	Cannabis, marijuana Smoke, straw, Texas tea, splim, Acapulco gold, bhang, boo, bush, beetter flower, ganja, weed, grass, pot, muggles, tea, hash, hemp, griffo, Indian hay, locoweed, hay, herb, J, mu, giggles smoke, love weed, mary warner, mohasky, mary jane, joint sticks, reefers, satina, roach	Orally; smoked	+	Animal studies indicate teratogenic potential; not established in humans[2]
	Other depressants Candy, goofballs, sleeping pills, peanuts	Orally; injection	+	Unknown
Narcotics	Heroin Snow, stuff, H, junk, big Harry, caballo, doo jee, boy, horse, white stuff, harry harry, joy powder, salt, dope, duinge, hard stuff, smack, shit, skag, thing	Injection; sniffed	+	(?) Intrauterine growth retardation; premature labor and low birth weight; increased perinatal morbidity and mortality; withdrawal symptoms 16,26
	Methadone Dolophine, dollies, dolls, amidone	Orally; injections	+	Neonatal tachypnea and alkalosis; withdrawal symptoms, sudden death 4,12
	Morphine M, dreamer, white stuff, hard stuff, morpho, unkie, miss emma, monkey, cube, morf, tab, emsel, hocus, morphie, melter	Injection	+	See Heroin
	Codeine Schoolboy	Orally; injection	+	Unknown
	Hydromorphone Dilaudid, lords	Orally; injection	+	Unknown
	Meperidine Demerol, isoipecaine, dolantol, pethidine	Orally; injection	+	Unknown
Exempt preparations	P.G., P.O., Bluevelvet paregoric with antihistamine, red water, bitter, licorice	Orally; injection	+	Unknown
Hallucinogens	Lysergic acid diethylamide LSD, acid cubes, pearly gates, heavenly blue, royal blue, wedding bells, sugar, bid D, blue acid, the chief, the hawk, instant zen, 25, zen, sugar lump	Orally	+	Possible mutagen; increased risk of spontaneous abortion; results appear different with illicit vs pure LSD studies 6,9,19,28

*Assessment of fetal effects is complicated by use of multiple drugs, poor nutrition and infection.

Figures 7-1 and 7-2 graphically illustrate the results of smoking and drinking during pregnancy.

Fig. 7-1. THE ALCOHOL YOU DRINK REACHES YOUR BABY

Fig. 7–2. SMOKE FROM YOUR CIGARETTE REACHES YOUR BABY

COUNSELING

Changing lifestyle habits such as smoking and the consumption of alcohol, coffee and drugs can be difficult. In order for the health practitioner to be effective in helping change such habits, these points may be useful.

1. **Establish the extent of the woman's drinking, smoking, etc.** Try the sample questions below substituting drugs, smoking, and coffee in the place of alcoholic intake. Ask in a straightforward manner. For example, *"Do you drink any beer, wine or liquor?"* If the answer is yes, appropriate follow-up questions would include,

   - *"How much do you drink at one time?"*

If the answer is no, a further probe might be necessary. Any of the following might be successful in revealing additional information.

- *"Have you drunk any beer, wine or liquor during this pregnancy?"*
- *"Does not drinking bother you at all?"*
- *"What do you usually do when you are around other people who are drinking?"*
- *"Do you get any pressure to drink from others?"*
- *"Did you drink before you were pregnant?"*

Accurate information is essential for effective counseling. Incorporating questions about alcohol, drugs, cigarettes, etc. into the diet history may make them less threatening. If the questions are asked without implied criticisms, most women are very cooperative.

2. **Avoid judgment.** Support for cutting down or quitting should be provided. The woman must feel the health professional is on her side.

3. **Elicit the woman's own feelings.** Questions such *"How do you feel about smoking during pregnancy?"*. *"Does drinking while you're pregnant worry you at all?"* or *"Have you tried to cut down?"* will allow the woman to express her concerns. These questions must be asked without judgemental overtones. If the woman feels you are critical, she will be more defensive.

4. **Avoid scare tactics, but provide available information on the effects of these substances on the baby.** This information may help the woman quit smoking, drinking, or taking drugs. Graphic aids may also help get the point across.

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LEAD EXPOSURE IN PREGNANCY

8

HEALTH EFFECTS OF LEAD IN PREGNANCY

Environmental lead pollution represents a potential hazard for pregnant women and their infants. Lead crosses the placenta, and both maternal and newborn levels are comparable. A number of public health authorities and researchers have stated that there is no level of body lead which may be considered safe. The rapid rate of brain growth during the prenatal period and the vulnerability of central nervous tissue to the effects of lead are of particular concern when considering fetal exposure to lead.

Severe maternal lead poisoning, as has been reported in rare cases of occupational exposure and maternal pica for lead-containing materials, may cause congenital lead poisoning in offspring (1,2). Heavy industrial exposure in pregnancy has also been associated with increased incidence of spontaneous abortion (3). Elevated lead levels in pregnancy short of toxic levels may cause early membrane rupture and premature birth (4). High lead levels have been found in the placentas of malformed and stillborn infants (5). An association between excessive prenatal exposure and mental retardation in offspring has been suggested (6).

In laboratory animals, heavy lead exposure during gestation is teratogenic (7). A recent, large scale human study revealed a correlation between high cord blood levels in newborns and an increased overall incidence of minor birth defects (8). No single characteristic defect was found. The investigators hypothesize that lead interacts with other teratogens to increase the overall likelihood of minor malformations.

ENVIRONMENTAL SOURCES OF LEAD

Potential sources of environmental lead include lead-based paint, auto emissions, industry, water, soil, food, tableware, and other miscellaneous items. The environment of the urban poor is often high in lead because of the lead-paint problem from older, deteriorating housing stock, and the proximity of heavy traffic and industry. Table 8-1 lists sources of lead reported in the literature. Table 8-2 reviews the subject of lead in food, which accounts for approximately one half of the lead ingested by adults in this country.

Table 8-1. SOURCES OF LEAD

Other than lead paint, the sources listed below are either unusual or low-dose. However, exposure to multiple low-dose sources over time may add significantly to the lead burden of an individual, especially in the presence of nutritional problems which favor increased absorption of lead, such as iron-deficiency anemia and low calcium consumption.

- Lead paint in deteriorating, older housing stock or homes undergoing renovation
- Auto emission
- Industry: lead smelting, storage battery manufacturing, auto body painting, printing, pottery glazing, soldering, stained glass
- Soil
- Tap water, in older buildings with lead plumbing
- Colored newsprint (yellow, red or orange inks especially) used in newspapers, comics, magazines, children's books and playing cards
- Some cosmetics
- Some jewelry
- Some detergents
- Paint coating of pencils

NUTRITION-RELATED SOURCES OF LEAD IN PREGNANCY

Pica

The practice of pica (the ingestion of non-food items) may expose a pregnant woman to high-dose sources of lead. Severe lead poisoning has been documented in pregnant women with pica for lead-containing materials, resulting in congenital lead poisoning in the newborn. (See Chapter 14 for more information on pica.)

Bone Meal and Dolomite Taken as Calcium Supplements

Lead is stored in the bones of animals, and thus bone meal may be a source of undue lead. Dolomite, which is calcium magnesium carbonate, also contains lead. Samples from one manufacturer of these supplements showed that, when taken in the amount stipulated on the label, the level of lead ingested daily was increased over average adult levels by a factor of 60% (9). The lead content of these products is variable and unpredictable, and some individuals may consume substantially more than is recommended. When a calcium supplement is indicated, calcium carbonate, calcium lactate or calcium gluconate are recommended.

Urban Gardens

Lead in the soil and air pollution may contaminate vegetables grown in urban gardens or gardens near houses undergoing renovations. Regular consumption of such produce in the absence of proper soil testing is discouraged.

Tap Water in Older Buildings

Tap water that runs through or sits in lead piping or pipes soldered with lead will be contaminated by lead that is leached out of the pipes. Running the water for 2-3 minutes in the morning before use will minimize the amount of lead in the water.

Table 8-2. LEAD IN FOOD AND FOOD-RELATED SOURCES

- Canned food: In the past, food processors used lead as a component of cans, in addition to soldering the seams with lead. The lead would leach out into the food or juice, especially if the food were acidic such as fruit, juice, tomato products and sauerkraut.
- Canned fruit juice: orange juice and pineapple juice stored in opened cans were believed to contribute significantly to the total lead exposure of affected children. In 1981, FDA issued a warning advising storage of canned fruit juice in glass or plastic containers.

  Although food processors are phasing out the use of lead in cans, it is still advisable to use plastic or glass containers for storage of food once cans are opened.
- Produce from urban gardens: lead pollution of the soil and air may contaminate produce grown in urban gardens.
- Tap water: may contain significant lead in older buildings with lead pipes and/or lead soldered pipes.
- Cookware and tableware: improperly glazed ceramic ware, earthen ware, silver-plated hollow ware, lead pewter ware, porcelain pots and pans, and glasses and cocktail glasses with decorative decals and glazes
- Bootleg liquor
- Bone meal, dolomite and some oyster shell products taken as calcium supplements
- Home remedies: Azarcon (Spanish); Paylooah (Lao/Hmong). These powders are used to treat fever, diarrhea and other ailments.

Renovating/Refinishing

Renovating an older home and/or refinishing furniture can contribute to high lead levels. In households with pregnant women, such activity has been shown to correlate with increased lead levels in the newborn (10). The study showing this association defined refinishing activity as any sanding, scraping or painting taking place in the home within 6 months prior to birth of the newborn.

NUTRITIONAL STATUS AND LEAD POISONING

Nutritional status modifies susceptibility to lead poisoning. In general, an adequate diet is to some extent protective because it minimizes GI absorption of lead, whereas a poor diet favors undue lead absorption. The following factors specifically increase GI absorption of lead: an empty stomach, iron-deficiency anemia, dietary deficiency of iron, calcium, zinc, phosphorus and protein, and dietary excess of fat, protein and vitamin D.

An Empty Stomach

An empty stomach favors lead absorption. Estimates of the percent increase in absorption in the fasting state range from 35-70% (11,12). When lead is ingested with a meal, the rate of absorption is 6-14%. Pregnancy nausea and vomiting, attempts to limit weight gain and inadequate food supply due to poverty may lead to irregular eating patterns and periods when the stomach is empty. These patterns may contribute to increased lead levels in pregnancy where there is significant lead exposure.

Iron-Deficiency Anemia

Iron-deficiency and the resulting anemia, even if mild, increase lead absorption. Iron-deficiency and anemia are common in pregnant women. It has been reported that an iron-deficient adult absorbs 2-3 times as much lead as an iron-replete individual, thus raising the generally accepted value of 10% absorption of dietary lead in adults to 20-30%. In addition, anemia is thought to predispose to pica, another possible route of prenatal lead exposure (13).

Sub-Optimal Intakes of Iron, Calcium, Zinc

Although a number of nutrients are known to effect lead susceptibility, the focus of concern in prevention efforts has been on those nutrients, namely, **calcium, iron** and **zinc,** which may be consumed in sub-optimal amounts by large segments of the at-risk population of infants, children and women of childbearing age.

Diets low in **iron** increase GI absorption of lead. Some workers in this area hypothesize, on the basis of animal studies, that high levels of iron intake, exceeding amounts necessary for nutritional reasons, may prove to be helpful in preventing lead toxicity (14). Until this hypothesis is confirmed, the advice for children at risk, which is to insure that the RDA is met and to include an iron-rich food at every meal, is advisable for pregnant and lactating women at risk as well. Compliance in taking iron supplements should be emphasized.

It is well established from animal and human studies that **calcium** affects the absorption as well as the body's storage of lead. As dietary calcium decreases, lead absorption from the gut increases. As long as a century ago, workers in the lead industry were given milk as a protective food supplement. Children with elevated lead levels have recently been found to have lower dietary intakes of calcium than matched controls, some of whom were siblings (13).

Many authorities in childhood lead poisoning prevention recommend that for children at risk, particular attention be paid to meeting the RDA for calcium, and that a calcium-rich food be included at each meal. This recommendation can be readily extended to pregnant and lactating women.

In studies with experimental animals, diets low in **zinc** also favor absorption of lead. In addition, zinc appears to be protective against some adverse effects lead has on heme production at the cellular level. Zinc is low to marginal in the diets of substantial numbers of women from all socio-economic levels. Care must be taken in dietary planning to meet the RDA for zinc in pregnant women.

Excess Intakes of Fat, Protein and Vitamin D

High **fat** diets increase lead absorption in animals. The American diet may be characterized as a high-fat diet. Moderation in the intake of fatty foods should be recommended.

In animals, high **protein** and low protein diets increase susceptibility to lead. Diet surveys show that in Western countries pregnant women typically consume somewhat more protein than recommended amounts, a finding indicating that, overall, protein intakes are probably not a public health concern. However, individuals with poor prenatal weight gain are at risk because low protein intakes are associated with low energy intakes in pregnancy.

Vitamin D has been shown to increase deposition of lead in bone of animals. Pregnant women may ingest excess vitamin D when routine prenatal vitamin supplementation is combined with consumption of large amounts of milk and/or vitamin D fortified foods such as breakfast cereals.

SCREENING, REFERRAL AND COUNSELING

The chances of a pregnant woman developing toxicity from any of the food and food-related sources of lead previously discussed are small. However, exposure to one or more of these sources over time, in combination with other sources of lead, especially in the presence of sub-optimal nutritional status, may produce an undesirable elevation of lead in mother and infant.

Knowledge of the population served, a careful diet history and common sense will dictate the extent of screening and education appropriate to any individual prenatal patient. Pregnant women with pica or known occupational exposure to lead need prompt referral for lead testing. Women with some combination of several of the following risk factors should be strongly encouraged to have a blood lead level done:

- — living in a known high-lead environment, i.e., in older deteriorating, urban housing, in a house under renovation or having a family member with a history of lead poisoning
- — low income
- — iron-deficiency with or without the presence of anemia
- — sub-optimal intake of calories, iron, zinc, calcium
- — irregular eating pattern
- — self-medication with bone meal or dolomite.

Nutrition counseling may involve counseling for dietary adequacy or improved eating patterns, or education about minimizing food-related sources of lead. In many cases, the first step in correcting inadequate diet will be assuring that the client has the resources to obtain the necessary food through making referrals to income assistance programs, Food Stamps or WIC, as appropriate.

Table 8-3. RESOURCES FOR LEAD POISONING IN MASSACHUSETTS AND NEW ENGLAND

- **Newsletter**
  New England Consortium of Childhood Lead Poisoning Programs
  302 Cannon Building
  75 Davis Street
  Providence, RI 02908
  (401) 277-2312

- **Blood tests**
  Refer to own doctor, a local clinic or board of health or Massachusetts Childhood Lead Poisoning Prevention Program (617) 522-3700 ext. 177 & 188
  1-800-532-9571 (outside Boston area)

  The Office of Environmental Affairs
  Boston Childhood Lead Poisoning Prevention Program
  (617) 424-5965

- **Water testing**
  Same sources as listed above for blood tests.

- **Deleading information**
  Massachusetts Childhood Lead Poisoning Prevention Program
  (as listed above)

- **Soil Testing**
  Suffolk County Extension Office
  150 Causeway Street, 8th floor
  Boston, MA 02114
  (617) 727-4107

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Nutrition Counseling

CONCERNS OF THE PREGNANT WOMAN

9

Every woman comes to a counseling session with her own concerns and problems. Unless these are acknowledged and discussed or mutually put aside, they will prevent a counseling session from getting off the ground. The woman may be thinking about her problem while you are attempting to suggest how many glasses of milk she should drink. For a counseling session to be productive, these issues must be considered.

General areas in which women may have concerns are as follows:

MECHANICS OF THE COUNSELING SESSION

Many women wonder what's going to happen when they meet with the nutritionist. Giving them an overview of the interview process and mechanics may make them more comfortable. Common questions women may have include:

- ☐ *Why am I here?*
- ☐ *How long is this interview going to take? (I've been here an awfully long time and I'm hungry), or (I thought this was going to take ten minutes. I have a ride waiting outside).*
- ☐ *What questions will I have to answer in this interview?*

KNOWLEDGE AND ATTITUDE ABOUT FOOD AND NUTRITION DURING PREGNANCY

Common concerns include weight gain, cost of food and the importance of nutrition during pregnancy.

- ☐ *Why do I have to talk about what I eat? I don't think it matters that much.*
- ☐ *Is she going to tell me to eat foods I can't possibly afford or never liked?*
- ☐ *Does she understand my food choices and methods of cooking and seasoning?*
- ☐ *Am I gaining too much? What will happen if I gain too much? How much is too much? Will she "yell" at me?*

PERCEPTION AND ATTITUDE TOWARD COUNSELING

Many women fear that the nutritionist may criticize present eating practices or demand that they eat a certain way. Common problems and concerns might include:

- ☐ *Is she going to put me down because of the food I eat?*
- ☐ *Is it safe to tell her EVERYTHING I eat and drink?*

- ☐ *Is she going to preach and lecture to me?*
- ☐ *I know what I'm supposed to eat. I've heard all this before.*
- ☐ *All I want to know is exactly what to eat. Just write it down for me.*

OTHER CONCERNS

Other problems connected with the pregnancy may make the woman unable to listen or to work on changing eating habits. These may include problems at home, problems with the baby's father and other family members, financial problems, medical problems or attitudes towards her pregnancy.

The experienced nutrition counselor will try to create and maintain a comfortable atmosphere and will elicit the woman's concerns in the course of an interview. The counseling interview proceeds most effectively if it is a guided conversation that includes the following elements:

- ☐ *Making the woman comfortable and explaining the interview procedure*
- ☐ *Getting general information about her concerns and attitudes toward pregnancy, medical history*
- ☐ *Taking a diet history*
- ☐ *Discussing any necessary changes to be made*
- ☐ *Giving written materials and the next appointment.*

The following are some suggestions on how to make the interview productive and satisfying to both the client and nutritionist.

1. First make the woman feel comfortable. Explain the reason for the interview, how long it is going to last and exactly what is going to happen. You know the procedure because you've done it many times; remember, this is probably the first time for the client. Explain what a nutritionist does, and why the client is seeing you. Explain the steps of the interview. If the woman is in a real hurry or cannot listen because of other problems or expectations, do as much as you can in your limited time together and explain this to her. Try to schedule another appointment, if possible. Any small step done completely is better than trying to rush through everything without her attention. Asking at the beginning of the interview if the woman has any questions sometimes elicits underlying concerns.

Women will vary in their attitudes toward their pregnancies. Many women have ambivalent feelings about the pregnancy itself and the effects that a baby will have on their life. The physical experiences of pregnancy vary too. Some women are uncomfortable, or unable to sleep. Others may have already made big changes in their lives - stopped or reduced their cigarette smoking or stopped drinking, for example. Allowing discussion of the negative aspects of a pregnancy may reassure a woman that these feelings are perfectly normal and that she doesn't have to think her pregnancy is all wonderful.

The woman may have problems at home; she may not want to be pregnant; she may have trouble with the doctor or nurses; she may have medical complications. If these are immediate concerns, she will not be able to respond very well to what you are saying. Questions like "How are things going with this pregnancy?" might help.

If she seems to be responding without enthusiasm, some direct question or comment on her mood may help - for example, "You look tired," or "Are you in a hurry?" Encouraging a client to discuss negative emotions about the counseling session is difficult since a nutritionist's first impulse is to politely ignore such signals. However, clearing the air through direct questions or statements allows the session to continue on better ground.

A woman may also have different concerns as her pregnancy advances. In her first trimester she is getting used to the idea, whereas in the last couple of months she is probably thinking about labor and delivery and the coming of the baby.

2. **Ask her if she has ever been given any information or advice about nutrition during pregnancy.** This may bring out bad experiences, myths or areas of misinformation. It will also prevent you from discussing information she already knows. Leading questions may help - *"Are you worried about your weight? Are you eating different foods since you've been pregnant? Has your appetite changed?"*

3. **Taking a diet history is information-sharing.** The woman is sharing her eating habits with you. Most people are afraid that their eating habits will not meet the nutritionist's standards. Withhold evaluation of her food intake while learning about her habits. Don't be judgmental. This is probably the most important and most difficult aspect of effective counseling. Small comments, body language or tone of voice can be taken as passing judgment. If she says she had three candy bars for breakfast and your response is *"You did! Really!"*, it is obvious you don't approve. The client may respond by clamming up, by trying to shock you or by telling you what she thinks you want to hear. Positive judgements like *"Oh, good! Cheese is a great snack"* are also counterproductive, since she may feel that she has to live up to this standard. What is she going to say if she had a bag of chips and a candy bar for her other snacks? A nod or murmur indicate that you have heard her and want to hear more.

4. **Once you have gotten information on her eating habits and daily food intake, compare the nutritional quality of her diet with the recommended guide for pregnancy.** Provide positive reinforcement for good food choices. Point out good aspects of her diet before discussing any necessary changes. Be specific about reasons for making changes, and then give her responsibility for making them. Instead of saying *"You should drink four glasses of milk,"* say *"As you can see, we recommend four glasses of milk for pregnant women because the additional calcium and protein is needed for the baby's growth and bones. You had only one glass daily. Can you think of any way you could drink more milk (or eat more dairy products)?"* Another technique is to ask the woman to point out what problems she sees with her diet and then have her make suggestions on how she would like to change her eating habits.

Most women may never have perfect eating patterns. Try to work on the changes most critical to nutritional quality or the ones the woman seems most anxious to work on herself. Accept a range of food practices. You may not think white bread is the best because it lacks fiber and may be low in trace minerals. However, it may be a low priority for change if the woman's diet is also inadequate in protein or calcium. A woman may drink no milk and only like processed cheese; that's better than no dairy products at all.

The central responsibility of the nutritionist is to work with the woman to modify her diet when necessary, but the changes must be possible for her. Small change over a period of time (if you can see the women often) are the most successful. Do not work for perfection but for the possible. The woman may only want to make one change in her eating habits; so focus on the most important.

Summarize changes you and she have decided on before she leaves. Set up the next appointment and make any referrals that are necessary. Suggest educational or support groups she might be interested in, if they are available.

Be sure to ask if she has any questions at the beginning, at the end of the interview and throughout, if this seems appropriate.

Do not put her off by using language/terms/ vocabulary she may not understand.

Remember each woman is different and is an individual. Some women may be very uninterested in anything to do with nutrition while others may be fascinated.

Gear your approach to the attitude of the woman.

And finally, remember: this kind of counseling takes time and energy, which you may not always have. Don't be hard on yourself if you can't always pull it off.

NUTRITION ASSESSMENT AND CARE PLANNING

10

Ideally, nutrition assessment and care planning should be a routine and ongoing part of every pregnant woman's health care.

NUTRITION ASSESSMENT

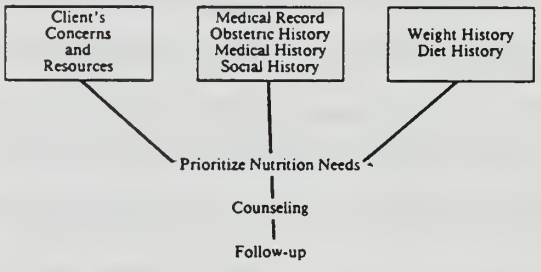
The nutrition assessment assembles information relevant to the client's nutrition status from a medical history, physical exam and weight history, obstetric history, social history, diet history and lab assessment. (See Fig. 10-1). The nutrition assessment serves two functions:

1. It identifies women most at risk for poor maternal nutrition. These women have a greater chance of unfavorable pregnancy outcome. They should be given more intensive nutrition counseling. If a nutritionist works in a large program and has limited time, s/he may be able to see only these high-risk women.

2. For women at risk and for women who have normal pregnancies, the information obtained on the assessment, especially the diet history and weight history, gives the nutrition practitioner information about what changes need to be made in each woman's eating patterns, and in what priority.

The specific questions appropriate to each part of the nutrition assessment are included at the end of this section. However, the nutritionist doing the counseling will not ask every question listed. Such questioning would be long and tiring for the client and nutritionist. Most of the questions will already have been asked by a nurse, physician or social worker; the answers will appear somewhere in the medical record. The weight and diet history would be best done by the nutritionist.

Fig. 10-1. STEPS IN NUTRITION ASSESSMENT AND CARE PLANNING



When questions are being asked, sensitivity will hasten the process. The answer to one question often provides answers to other questions as well. In addition, the practitioner should be alert to problem areas. These areas will involve more questioning to determine the extent of the problem, while trouble-free areas can be reviewed very quickly.

Table 10-1.
OBSTETRICAL RISK FACTORS
TERMINOLOGY

Viability — the point at which the fetus reaches 20 weeks gestation

Abortion — the process by which the products of conception are expelled from the uterus via the birth canal before the 20th week of gestation

Spontaneous abortion — abortion occurring naturally

Therapeutic abortion — induced abortion

Gravida — a woman who is pregnant or who has been pregnant

Primigravida — a woman who is pregnant for the first time

Multigravida — a woman who has been pregnant more than once

Parity — the number of pregnancies reaching viability (not the number of fetuses delivered); thus, parity is not greater if more than one fetus is delivered (e.g., twins or other multiple births), and parity is not less if the fetus is stillborn

Parous — the woman has delivered a viable infant

Multipara — a woman who has completed two or more pregnancies to the stage of viability

Nullipara — a woman who has never reached 20 weeks in a previous pregnancy, although she may have been pregnant more than once (a multigravida)

Primipara — a woman who has delivered a fetus (or fetuses, as in multiple birth) once that has reached the stage of viability

Low birth weight — (LBW) an infant weighing under 2500 grams at birth

Premature infant — an infant delivered before the 38th week of gestation

Small for gestational age (SGA), small for dates (SFD), fetal growth retardation (FGR), intrauterine growth retardation (IUGR or IGR) — all refer to LBW infants born at term, or after 37 weeks gestation

Neonatal death — a liveborn infant who dies within 28 days of birth

Perinatal mortality — stillbirths plus neonatal deaths (expressed per 1000 births)

Stillbirth — an infant born after the 20th week gestation who did not breathe after birth or show any other sign of life

Gravida _____, para_____ — a method used to summarize obstetrical history

3-1-1-4 — an alternative method to summarize obstetrical history

first digit:	number of term infants delivered
second digit:	number of premature infants
third digit:	number of abortions
fourth digit:	number of living children

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Medical History

Pre-existing disease complicates the course of pregnancy. Nutrition care appropriate to the medical risk will be required. In determining the prenatal patient's medical history, the following information should be obtained:

1. Source of primary health care; date of last visit
2. History of anemia(s) or lead poisoning
3. Diabetes, and family history of diabetes
4. Present diagnosis or history of cardiac, hypertensive, renal, thyroid, gastrointestinal disease; cancer; seizure disorder; infection; tuberculosis
5. Physical handicap(s)
6. Mental illness or mental retardation
7. Poor oral health: inadequate dental care, excessive caries, gum disease, missing teeth and/or dentures
8. History of an eating disorder, such as anorexia nervosa or bulemia
9. Current treatment for any medical condition(s), including medication, diet restriction or other therapy.

Laboratory Data

Information on laboratory data is found in **Laboratory Indices During Pregnancy.**

Obstetrical History

An obstetrical history identifies those individuals at obstetrical risk who may be seen more frequently by their medical provider and who may benefit from intensive nutrition counseling. The following conditions may necessitate additional counseling by the nutritionist:

— Gestational diabetes in current or previous pregnancy
— Multiple pregnancy
— Underweight or overweight at onset of this pregnancy; inadequate weight gain or weight loss in this or past pregnancy; short stature (less than 5 '2")
— Anemia(s)
— Lead exposure
— Extended nausea and vomiting
— Current treatment for any prenatal conditions: medications, diet restrictions, other therapy.

Additionally, it is imperative that the client's care be integrated among all health providers. This integration is highly preferable in all cases, but more essential with cients whose medical and/or obstetrical history reveals a high risk condition.

An obstetrical history includes the following:

— EDC — "expected date of confinement", that is, the woman's expected date of delivery or due date
— Weeks gestation at first obstetrical visit during this pregnancy; weeks gestation at first nutrition consultation
— Age at onset of current pregnancy (for adolescents, note years between menarche and conception of current pregnancy)
— Parity — the number of pregnancies that have reached viability
— Interconceptional period
— Obstetrical history, including previous abortion, stillbirth, neonatal death, birth defects, low birth weight infant, premature infant
— History of cesarean section
— Pre-eclampsia, eclampsia or hypertension in current or previous pregnancy.

Early prenatal care is especially important to pregnancy outcome in high risk populations. Similarly, when nutrition intervention is necessary, the greatest effects will be seen with early nutrition intervention.

Maternal **age and parity** affect perinatal mortality, birth weight and gestational age, and may be associated with other nutrition-related problems seen in pregnant women. Mothers under 15 years are at-risk for pre-eclampsia, prematurity and low birth weight (LBW) infants. The shorter the interval between menarche and conception of the current pregnancy, the greater the risks. Four years after menarche, or generally speaking, by age 17, physical growth and maturity are attained, and the risk of prematurity drops significantly. Multiparas under age 17 have the highest rates of LBW infants, prematurity and neonatal death. Women under 19 are at risk for anemia and pre-eclampsia. Women over age 35 have high rates of prematurity; in addition, there is more obesity, hypertension and hypertensive disorders of pregnancy in this group. Overall, the years of lowest reproductive risk are from age 20 to 29 years.

First pregnancies are associated with overall increased obstetrical risk regardless of maternal age.

Repeated short interconceptional periods, or a total of 5 or more pregnancies, tend to deplete nutritional stores; iron and calcium are of particular concern. Women of high parity have a greater chance of developing diabetes. It is not known whether pregnancy itself is diabetogenic, or if the stres of repeated pregnancy causes latent diabetes to manifest itself.

Problems such as **fetal loss, prematurity, LBW, neonatal loss** tend to reoccur in subsequent pregnancies; full nutritional support in the current pregnancy is warranted in individuals with such histories.

Some **birth defects** may be related to nutrient excess or deficiency, or to alcohol intake, as in the Fetal Alcohol Syndrome.

Because **cesarean section** is frequently repeated in subsequent births, a history of operative delivery indicates the need for optimal nutrition in the present pregnancy.

Multiple pregnancy carries significant risk of perinatal morbidity and mortality, and is associated with pregnancy nausea and vomiting, anemia, pre-eclampsia, LBW, postpartum hemorrhage and other problems. Nutritional guidance is indicated, particularly in the area of weight gain.

Prepregnancy weight and **weight gain** in pregnancy are the major determinants of birth weight, after gestational age.

Underweight women and women of **short stature** are at high risk for LBW and prematurity. These two categories of women (and young adolescents) benefit most from adequate weight gain in pregnancy in terms of the birth weights of their infants.

Overweight women have more hypertensive disorders of pregnancy and more gestational diabetes. Multiparous women tend to repeat their patterns of weight gain in successive pregnancies. Thus, a history of inadequate weight gain in pregnancy indicates the need for close attention to weight gain in the current pregnancy.

For discussion of the remaining factors — **hypertensive disorders, gestational diabetes, anemias, lead exposure, nausea and vomiting** and **medications** – see the appropriate sections devoted to these topics.

Social History

A social history can provide information on a woman's general environment and her individual ability to cope. It may not always be necessary to ask a list of questions in order to get this information. Sensitive listening, simple observation and ordinary conversation will reveal important information.

Health practitioners must be sensitive to the implications of the woman's socioeconomic situation. If income is limited, food intake is likely to be affected. Working late in pregnancy may impose additional physiological and emotional stress. Cultural, educational or language differences may make it difficult to obtain adequate health care or buy foods usually preferred. The extent and quality of a woman's emotional support system may often have an effect on a woman's ability to cope, take care of herself and eat adequately.

Some of the following may be important:

1. EMPLOYMENT: Is she working? Full or part-time? Does the job involve physical or sedentary activity? Is time allowed for meals and snacks? Does she buy meals on-site or bring meals? If she buys, what is available? Will she be quitting or returning to work after the baby is born?
2. INCOME: How much of the family income is available for food? How large is the household?
3. INSURANCE: Does she have health insurance?
4. ASSISTANCE PROGRAMS: Does she receive public assistance, food stamps, WIC, SSI, disability?
5. HOUSING: Does she have adequate housing? Is there room for the baby? What about other children?
6. LANGUAGE: Does she speak a foreign language? Does she speak English? Does she have someone to interpret?
7. FAMILY: How many in the household? Does she live alone?

Diet History

A detailed, accurate diet history is necessary to determine the nutrition care plan and the focus for nutrition counseling. A diet history may include the following:

GENERAL INFORMATION

1. Appetite — good, fair, poor when not pregnant? Changes in pregnancy? Good, fair, poor now? "Morning sickness" or nausea? When? When most hungry?
2. Heartburn or constipation?
3. Food allergies or intolerances?
4. Cravings or pica? What kinds of foods are craved? When and how often? What quantities are consumed? Are any non-food items consumed?
5. Cultural or religious food practices? Beliefs regarding what one should or should not eat while pregnant?
6. Diet restrictions or special diet? What type and why? How successful? Diet pills?
7. Smoking? How much per day? What brand? How long? Ever tried to quit or cut down?
8. Alcohol? How often? What kind? How much?
9. Prescription drugs or over-the-counter medicines? (e.g., aspirin, laxatives, etc.)
10. Any other drugs?
11. Vitamin or mineral supplements? How much? How often?

24-HOUR RECALL

A 24-hour recall is helpful in establishing a picture of the individual's intake. The practitioner asks the woman what foods and liquids she consumed in the past 24 hours. If the woman cannot remember what she ate, or if she tries to meet the interviewer's expectations, or if she cannot estimate portion size, a 24-hour recall may be inaccurate.

Many women do not have typical breakfast/lunch/supper meal patterns. They may eat 1 or 2 meals a day, they may snack all day long or they may eat at atypical times. Women with jobs at different shifts, or with partners with jobs on different shifts may have different meal patterns. Finding out a woman's usual meal pattern (before getting a 24-hour recall) is helpful.

One way to ask this is as follows:

- How do you usually eat? Do you eat snacks, meals or some of both?
- If you eat meals, how many do you usually eat? One? Two? Three? More?

After determining a meal pattern (if there is one), the diet history (as outlined below) can proceed more smoothly. The phrasing of questions is crucial; the following is suggested:

- When you got up yesterday did you have anything to eat or drink? What kind? How much? What was in/on it? Did you finish it? How did you cook it? (These questions can be asked about each item of food and drink mentioned to allow a more detailed, accurate assessment of dietary intake.)
- Did you have anything else to eat or drink, or a snack, after that?
- At your next meal, did you have anything to eat or drink?
- Did you have anything else to eat or drink (or a snack) after that?
- Did you have supper or an evening meal?
- What did you have to eat or drink?
- After supper, did you have anything to eat or drink later in the evening?
- Did you have anything to eat or drink at bedtime?
- Did you get up in the night to eat or drink anything?

When a woman finds it hard to remember a meal or thinks she had "nothing", asking again, "Were you thirsty?" or "Did you snack on anything, instead?" sometimes elicits a response. Ask where they were or whom they were with, if they are having trouble remembering.

After getting the 24-hour recall, it is important to ask if it was a typical intake, and if not, what is "typical" or "usual". Note the discrepancies on the 24-hour diet history form.

FOOD FREQUENCY

A food frequency record is used to get a more complete picture than what may be obtained from a 24-hour recall. Foods are usually listed by major nutrients or food groups. A woman is asked how often in a week she normally eats these foods or what foods she likes and what foods she dislikes. Not all foods a woman might eat are identified in a food frequency record, but a nutritionist will be able to fill in the gaps.

The food frequency record gives a quickly gained picture of the client's priorities among foods and food groups. Foods eaten frequently obviously contribute the most, cumulatively, to average food intake. In addition, clients respond positively to "What are your favorite foods?" and "What foods do you dislike?" These questions clue into the woman's usual approach and attitude to her own nutritional intake.

FOOD RECORD

A food record is a list of all foods eaten and beverages consumed, with portion sizes, recorded by the woman over a period of time. The time period could be 24 hours, 3 days, 7 days or longer. A food record is often effectively used in problem situations, since it is fairly accurate, depending on the woman's acceptance, motivation and aptitude. The woman's ability to remember to write down what she ate and to estimate portion size is important. The woman may also alter her actual eating patterns because she is recording everything she eats.

ENVIRONMENTAL INFLUENCES

The assessment of environmental influences can give insight into the woman's ability to control her own food intake and to prepare, purchase, and store food. Such influences may be determined by asking the following:

1. Are there adequate cooking facilities at home? Refrigerator/freezer, stove, oven broiler, toaster, hotplate or electric heating coil?
2. Who does the shopping? Are there adequate shopping places convenient to home? Where do you shop? Do you use food stamps?
3. Who cooks? — a relative? — a friend? Note ethnic origin to see if a predominant ethnic theme or influence exists in the type of cooking done at home.
4. Are other family members/people at home on a special diet?
5. Are meals usually eaten at home? Which are eaten out? How often? Where are they eaten? — cafeteria? — fast food chain? — employees' lounge with vending machines? — restaurant? Do you bring lunch or snacks to work? Is there a refrigerator available?

The above questions are meant to be "lead-in" questions which may indicate situations requiring follow-up with more extensive inquiry.

WEIGHT HISTORY

The weight history is discussed in **Weight Gain During Pregnancy.**

NUTRITION CARE PLANS

A nutrition care plan summarizes the pregnant woman's nutrition status and outlines the projected activities that will assist her in making recommended changes in dietary patterns to improve health status.

Before beginning a care plan, the nutritionist needs to know how much time and effort she can put into the counseling process, and if there are outside resources (groups or social services) that can be used to help the client achieve the goals of her care plan.

A nutrition care plan involves several steps, discussed in more detail below.

1. Prioritize nutrition needs, as determined from the nutrition assessment.
2. Determine the content of nutrition counseling.
3. Determine time frame for care plan.

Prioritize Nutrition Needs

Each client may have several nutrition problems. The most serious should be dealt with first, and in most detail. Problems such as severe overweight, very inadequate weight gain or low quality food intake require attention because of their possible threat to the outcome of pregnancy.

Clients may have different perceptions than the nutritionist about the seriousness of their nutrition problems. For example, a client may consider very low weight gain as beneficial since she is concerned about being overweight after the birth of her baby, or she thinks a small baby will make her labor and delivery easier.

In order to be effective, a counselor must consider the client's perceptions of what nutrition problems are most serious. If there is some disagreement about the severity of the problem, the nutritionist should explain his/her reasons for concern.

In addition, the client may have concerns that the nutritionist does not consider important. Often the approach of medical practice is to give medical imperatives exclusive priority and brush aside patient concerns. This attitude is obviously non-productive in encouraging compliance. A nutritionist should try to find out what the client considers important, and deal with her concerns as well as the nutrition needs considered medically important.

If a nutritionist is seeing a large number of clients, s/he may have to make a change of clients. Clients with more serious needs should be seen first, and given more time. In addition, clients who are interested in nutrition during pregnancy may be given some priority.

Content

The content of nutrition recommendations needs to be specific enough so that a client can put them into practice.

For example, a client with a low weight gain needs to understand the reasons for the suggested weight gain. By analyzing the diet history, the nutritionist will try to find where change can be made in the woman's eating patterns. Then s/he will try to discuss these changes with the client.

Time Frame

The nutritionist and client decide how often they will need to meet together to check on goals. This number will depend on the time of the nutritionist and client, the client's motivation and the seriousness of the problems.

Once the care plan is completed, the nutritionist should summarize the content for the client — main problems, recommendations, and follow-up visits. Any handout materials should be given to the client, reviewed together and questions discussed. The woman should not receive too much written material at the first visit; a care plan should include a sequence of handouts.

Some basic procedural guides accumulated from experience can facilitate the practice of nutrition counseling.

- Make clear the goal of the process, stressing potential benefit.
- Encourage client participation, find out "where she is at" and work from there.
- Keep the process within reasonable time limits.
- Limit the number of recommendations made at one time to one or two (four is maximum) clearly stated suggestions that the client agrees to try.

Resources of the Client

Assessing an individual's motivation and desire to take care of herself is also important. This assessment is usually not done by direct questioning — for example, "How are you feeling emotionally?" or "Did you want this pregnancy?" A sensitive practitioner can get clues to a woman's sense of herself through her answers to other questions, her general confidence level, and her present performance in taking care of herself. Sometimes direct questioning is appropriate; sometimes a woman will volunteer information.

Important things to keep in mind include:

1. Education level, capacity to understand
2. Motivation and commitment to this pregnancy
3. Emotional balance, maturity, ability to accept responsibility
4. Family and peer support available
5. Problems of other family members which may drain the woman's energies
6. Religion, cultural identity.

The nutritionist should be able to figure out, either directly or by inference, how involved and motivated the client will be in her own nutrition care.

To illustrate how care planning takes place, assume that an underweight pregnant teenager is the person with whom a nutrition care plan is to be formulated. Since underweight in pregnancy is recognized as a major threat to pregnancy outcome (i.e. the probability is higher that this girl will have a low birth weight newborn with the attendant hazards of increased incidence of illness in early life), the nutritionist recognizes early in the interview that this case will require extra time and attention. S/he therefore will make more detailed inquiries than would be needed with a woman of normal weight. The nutritionist inquires about weight history, its pattern and trends, recent and usual appetite, illness or trauma factors, or recent changes in lifestyles or living situation that affect the food supply. What are the woman's own feelings and perceptions about her weight status? The interviewer also finds out what the woman sees as the major constraints to increasing her food intake.

From this review the nutritionist gets a sense of how complex the eating situation is, what strengths the woman can bring to bear, and how much support she will need. Care in this case will require five or six revisits to cover the work that the woman and the nutritionist will do together. The interview reveals a girl with a poor appetite at this time, responsible for food preparation for herself and her boyfriend, but who has little experience in shopping and cooking. The food prescription, emphasizing protein and frequent food intake, will be something like: 1) eat frequent snacks, 2) try to eat more peanut butter and cheese, 3) take the vitamin supplements. And the homework will be to keep close track of what she is actually able to eat, what works out best, and report back at next visit. The long-term care plan will be to stress additional foods at each visit, with a view to increasing her ability to eat sufficient variety to meet her needs in pregnancy and to build her confidence in herself as a person who nurtures herself and her family.

Nutrition assessment and care planning are skills that improve with time. Each practitioner needs to develop a style that will allow him/her to get a sense of the most important issues and to decide the most effective way of working on them. This style will be a mixture of intuition, careful questioning, sensitive listening, observation, and integrating information obtained from all sources.

ASSESSMENT TOOLS AND RECORD-KEEPING

The use of standardized forms helps to ensure a consistent level of quality in nutrition assessment and care planning. These may include a nutrition assessment form which incorporates all of the elements of a comprehensive prenatal nutrition assessment. An example is the Massachusetts WIC Program Assessment and Certification Form for Pregnant Women, which is reproduced in the Assessment Forms section at the end of this manual.

S.O.A.P. notes may be a part of a nutrition assessment form or may constitute the entire nutrition care record, as one might find in a medical record. SOAP notes are a form of documentation in health care which includes the **S**ubjective and **O**bjective data, the **A**ssessment of health or nutritional status based on these data, and the **P**lan for intervention, including follow-up and referral. Below is a more detailed explanation of the SOAP note format:

"S" — Subjective data. Statements by the patient obtained by taking a history. This is how the patient feels, her concerns, her description of her status, which would include interim dietary intake and food habits.

"O" — Objective data. A summary of physical observations, findings, results of laboratory tests, and other parameters being followed (height, weight, hematocrit/hemoglobin, skin folds).

"A" — Assessment. Includes two elements: 1) diagnosis and 2) severity or degree. This is the nutritionist's view of the problem, considering the subjective and objective data. If the subjective and objective data are consistent, little needs to be said.

"P" — Plan. Describes recommended action as a logical result of the assessment. Includes counseling, anticipatory guidance, referrals, and future appointments for follow-up.

To assist in obtaining the Subjective data and to save time during a counseling session, a client questionnaire may be used. (See **Assessment Forms** for examples).

Two suggested formats for keeping track of counseling sessions are a client education checklist and a flow sheet. A client education checklist provides an effective way to track specific information routinely given to clients. Flow sheets provide information over time on nutrition-related indicators. Other health care providers often favor concise formats which emphasize objective information related to nutrition care, such as flow sheets, weight grids and SOAP notes. See following examples.

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PARAMETERS	DATES							
	5/16	6/18	7/15	8/20				
weight/last visit								
weeks gestation								
blood pressure								
hct/hgb								
glucose/ketones								
nausea/vomiting								
dietary intake (see notes)								
method of feeding								
vitamins/iron								
smoking								

PRENATAL EDUCATION CHECKLIST

Name:_____ First visit:_____

FIRST VISIT

____Explained OB program
____Explained CHN home visit
____Gave out telephone # sheet
____Gave out prenatal booklets

FIRST TRIMESTER (Up to 13 weeks)

____First trimester tapes/slides viewed
____EDC explained
____Normal body changes in pregnancy
____Growth & development of fetus
____Common problems
____Emotional changes
____Exercise ____Travel
____Sexual relations ____Clothing
____Rest ____Bedrest left side
____Personal hygiene ____Dental care
____Unusual symptoms reviewed
____Iron and vitamins
____Drugs in pregnancy ____Smoking
____Parent education class
____yes ____no

SECOND TRIMESTER (14-28 weeks)

____Second trimester tapes/slides viewed
____Fetal growth & development
____Common problems
____Contraception*
____Tapes/slides viewed
____All methods explained
____IUD ____diaphragm ____BCP's
____foam* ____condom ____other
____PPTL (are papers signed/____)
____Final choice _____
____Preparation for infant (24-28 weeks)
____Circumcision explained*
____Home preparation (clothing, equipment, formula)
____Immunizations ____Names
____Family adjustment
____Child care arrangements
____How to take infant's temperature
____Pediatrician* Dr. _____
____2-4 week check up
____Well child clinics

LABORATORY TESTS (explain as needed)

____2 hr. PPBS at 28 weeks
____Ultrasound ____Amniocentesis
____Non-stress/stress tests
____24 hr. urine collection
____Serum estriols
____Rubella PP immunization

THIRD TRIMESTER (28 weeks to delivery)

____Preparation for labor and delivery
____Third trimester tapes/slides viewed
____Signs of labor
____Review abnormal symptoms
____Hospital admission procedure
____Labor (IV, monitors, exams, breathing techniques)
____Birthing room
____Anesthesia
____Cesarean section
____Recovery
____Slides viewed

POSTPARTUM CONCERNS

____Postpartum tapes/slides viewed
____Self care (episotomy, lochia, blues, rest, etc.)
____PP support system* _____
____Birth verification
____PP CHN home visit
____Address where pt. will be staying
_____
____4-6 week check up
____Infant care (cord, PKU)

NUTRITION

____First nutritional encounter
____Nutritional assessment
____Second nutritional encounter
____"Inside My Mom", OR ____"Great Expectations"
____24 hr. recall, weight grid
____Accepted to WIC*
____Encounters up to 31 weeks ____, ____, ____
____24 hr. recalls and reinforcements
____Problems and instructions given: _____
_____
_____
_____
_____
____32 to 36 weeks ____, ____, ____
____Follow-up on recurring nutritional problems
____Breast feeding film
____Breast feeding instructions
____Formula preparation & feeding
____Introduction of solid foods
____Final method of choice: _____
_____

36 WEEK SUMMARY DONE

Starred items* above reviewed and completed on _____ by _____
(date) (initials)

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Nutrition Related Complications of Pregnancy

NUTRITION AND THE HYPERTENSIVE DISORDERS OF PREGNANCY

11

Although accurate classification is difficult, hypertension peculiar to pregnancy (pre-eclampsia and eclampsia) can *sometimes* be differentiated from chronic hypertension complicated by pregnancy. Differential signs include the time of onset and the presence of other identifying symptoms (proteinuria and edema). Often, such distinction cannot be made because background observations are incomplete or unknown.

Pre-eclampsia and eclampsia -- formerly called the toxemias of pregnancy although no toxin is involved, and currently called pregnancy induced hypertension -- are seen only in pregnant women. The triad of pre-eclamptic symptoms - hypertension, edema and proteinuria - tend to occur in the latter half of pregnancy or in the first week postpartum. Untreated pre-eclampsia can progress to the more severe eclampsia, in which convulsions, coagulation abnormalities, coma, and death can occur.

On the other hand, chronic hypertension usually antedates pregnancy or is detected before the twentieth week of gestation or persists beyond six weeks postpartum. This type of hypertension may be primary or essential hypertension with no detectable cause, or it may be secondary to renal or other disease. It occurs in pregnant women as well as nonpregnant women and in men. It is usually aggravated by pregnancy. Chronic hypertension increases the maternal hazards of pregnancy and the fetal mortality rate.

SIGNS AND SYMPTOMS OF PRE-ECLAMPSIA

Hypertension: Hypertension in pregnancy is defined as a blood pressure above 140/90 mm Hg. Because anxiety may cause transient blood pressure elevations, it should be verified by recording it on at least two occasions, six or more hours apart. However, hypertension is also considered to be present at lower blood pressure if the systolic is 30 mm or the diastolic is 15 mm above the usual blood pressure for the individual woman. The latter criterion is particularly relevant in young gravidas whose normal blood pressure may be 90/60 and who therefore might be flagged as hypertensive at 120/75. (Seventy-five percent of all women under the age of 35 years have normal blood pressure less than 120/80.)

Proteinuria: Proteinuria is the presence of protein (1+ or more) in a clean specimen of urine.

Edema: Edema is generalized and excessive accumulation of fluid in tissues, demonstrated by

1 + pitting or more. It is significant if it persists after 12 hours bed rest or if it is associated with excessive weight gain. Since normal pregnant women in late pregnancy can be expected to gain an average of 1 lb. per week, weight gains much over 2 lbs. per week should be viewed with caution.

In normal pregnancy total body water increases 6-8 liters. Due to decreased osmotic pressure of the plasma, 4-6 liters of fluid accumulate in the extracellular space. This normal physiological adjustment to pregnancy, coupled with lymphatic and venous stasis, usually causes edema, especially in the lower limbs. Generalized edema occurs in 80% of normal pregnancies.

However, edema characterized by puffiness around the fingers and eyelids may be more specific to pre-eclampsia than the edema of the lower extremities. A sudden, steep gain in weight over several days or a week, not attributed to changes in diet or physical activity, suggests the acute fluid retention of pre-eclampsia (1).

Other symptoms of advanced pre-eclampsia include increased deep tendon reflexes, decreased urinary output, visual disturbances, headaches, dizziness, upper abdominal pain, anorexia, and vomiting.

EPIDEMIOLOGY AND ETIOLOGY

Epidemiology

Pre-eclampsia is more frequent in primigravidas who are very young or over 30 years old. Elderly primigravidas (over age 35) as a group have increased significantly in numbers since the late 1970's. This group has at least twice the rate of essential hypertension as compared to younger women; pre-existing hypertension increases the risk of pregnancy-induced hypertension greatly, as much as fivefold, according to some estimates (2).

In multiparas, pre-eclampsia is not common unless antecedent hypertension, diabetes, multiple fetuses, or a family history of toxemia are predisposing factors (1).

In the United States the incidence of pre-eclampsia has been closely associated with low income, non-Caucasian and adolescent populations. The association of pre-eclampsia with non-Caucasian women is probably due not to any intrinsic biological characteristic but to the quality of prenatal care and the overall health and nutritional status of the patient. The double stresses of growth and pregnancy on the pregnant adolescent may account for the high incidence of pre-eclampsia in this group.

Etiology

The etiology of pre-eclampsia is unknown. Although marked sodium retention and edema are seen in some pre-eclamptic patients, pre-eclampsia is no longer believed to be caused by a normal or even high salt intake (3). The increased frequency of eclampsia in areas where dietary deficiencies are common suggests malnutrition as a predisposing factor (1). Dietary deficiencies of iron, calcium, vitamins A, D, B_1, B_2, B_6 and C (4) as well as protein (5) have been claimed as causes of pre-eclampsia. A higher incidence of pre-eclampsia was found in patients with a deficient intake of calories, vitamins and minerals (4,6), and protein (7). Dietary protein deficiency leads to hypoalbuminemia, which lowers the colloid osmotic pressure within blood vessels. This sequence has been implicated in the reduction of the blood volume of pre-eclamptic patients (8).

Recently, interest in the role of calcium in eclampsia has been revived by epidemiologic observations of Guatemalan and Ethiopian populations (9). In Guatemala, poor women whose diets were characterized by low intakes of calories, protein and vitamins, but high intakes of calcium (approximately 1 gram per day) had a low incidence of eclampsia, comparable to that of affluent, developed countries. In Ethiopia, where the calcium intake was at the same level, the incidence of eclampsia was similarly low, despite poverty and inadequate caloric intakes.

MANAGEMENT

In the past, the classic triad of prevention and treatment for pre-eclampsia was sodium restriction, dieting and diuretics. This practice is not only inadvisable, but also potentially dangerous to the mother as well as the fetus (10). Salt restriction was routinely prescribed during pregnancy to prevent increased fluid retention, hypertension and edema. It is now known that pregnant women have an increased need for sodium due to the expanded blood volume. Each liter of added extracellular water requires the retention of sufficient sodium chloride to maintain normal osmolality (10).

In addition, women with pre-eclampsia excrete large amounts of sodium, and further dietary restriction might cause adrenal exhaustion in an attempt to conserve sodium at the distal tubule of the kidney via the renin-angiotensin-aldosterone system. Thus while appearing to relieve the clinical symptoms of edema, sodium restriction may exacerbate the primary disorder. Signs of sodium depletion such as impaired renal function, decreased urine volume and increased serum uric acid occur in pre-eclampsia (11).

Although some obstetricians continue to routinely recommend moderate sodium restriction for patients with pre-eclampsia, the efficacy of salt restriction is in doubt. Increased salt has even been reported to be beneficial in relieving the early manifestation of

pre-eclampsia (11,12), although it is not generally acceptable treatment. While recommendations range widely – from salt to taste to increased dietary salt – there is agreement today that salt restriction is inappropriate in pregnancy.

Most obstetricians no longer believe that pre-eclampsia is caused by gaining too much weight. Excessive weight gain, whether of fat or water, does not cause pre-eclampsia. Restricting weight gain during pregnancy appears to be more hazardous than gaining too much weight. Pre-eclampsia tends to be more severe in the woman who is underweight at conception and who fails to gain normally during pregnancy. A weight gain of 24-30 lbs. is recommended, with a rate of gain of about one pound per week during the last 20 weeks of gestation. Obese patients should not be placed on reducing diets during pregnancy (3) since adequate weight gain during pregnancy is related to higher infant birth weight, decreased prematurity rate, and better growth and performance during the first year of life (10). The intake of obese women should be monitored for adequate protein, vitamins and minerals.

Routine diuretic therapy during pregnancy can result in serious and severe maternal complications including pancreatitis, volume contraction, alkalosis, decreased carbohydrate tolerance, severe hypokalemia, hyponatremia, and hyperuricemia (13). Complications in the infant can include arrhythmias, bleeding diathesis and hyponatremia. Some diuretics are potentially teratogenic. Diuretics are used rarely, for example, in some eclamptic patients to prevent cerebrovascular accidents, or in the management of those with congestive heart failure.

Women hospitalized for pre-eclampsia are routinely given a well-balanced house diet containing 80-100 gms of protein (or 1.5 gm/kg/day) (14) with adequate calories to meet the demands of pregnancy. Outpatients are advised to include 2 eggs, 1 quart of milk, and 4-6 oz. of lean meat in their daily diet (5).

Other recommendations for management of pre-eclampsia include adequate fluids and bed rest with patients lying on their left side. These practices increase urinary output.

Hospitalization and early delivery are often necessary. The drug of choice for eclamptic patients is magnesium sulfate to prevent convulsions.

CHRONIC HYPERTENSIVE DISEASE

The management of uncomplicated hypertensive disease is the same whether or not it occurs in a pregnant patient. The main features of treatment are sufficient rest with decreased strenuous activity and moderate sodium restriction. A normal pattern of weight gain is important; excessive gain should be avoided if possible. If a patient is already on hypertensive medication, that treatment is usually continued, although one must take into account the drugs that are contraindicated during pregnancy.

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ANEMIAS OF PREGNANCY

12

Anemia occurs frequently in pregnancy. Depending on geographical location and socioeconomic group, as many as 50% of pregnant women are anemic. The major causes are iron deficiency, folate deficiency, or a combination of the two.

IRON DEFICIENCY ANEMIA

Iron deficiency anemia accounts for approximately 75% of the anemias of pregnancy. A deficiency of iron produces an impairment in hemoglobin synthesis within the developing red blood cell, resulting in microcytic, hypochromic anemia (red blood cells which are abnormally small in size and deficient in hemoglobin). Patients with iron deficiency anemia have a significant decrease in red blood cell mass and a corresponding decrease in the oxygen-carrying capacity of the blood.

Iron deficiency anemia is prevalent because both the fetus and the maternal physiological changes of pregnancy require extra iron. (Refer to **Nutrient Needs During Pregnancy – Iron** for more detail). In addition, many women start pregnancy with inadequate iron stores and consume diets low in iron. For these reasons, meeting the extra requirements for iron during pregnancy becomes difficult, if not impossible.

Iron deficiency in the mother has several adverse effects. A drop in hemoglobin (Hgb) concentration results in increased cardiac output. Increased cardiac output is required to maintain adequate oxygen consumption by placental and fetal cells. As a result, shortness of breath and fatigue are common with iron deficient women. In addition, in the advanced stage, pallor, loss of appetite, weakness, lassitude, and edema can be associated with iron deficiency anemia. A severely low Hgb level (6 gm/100 ml and lower) places the mother at risk of cardiac arrest and results in a poor prognosis in the event of hemorrhage. The fetus, on the other hand, is relatively unaffected by maternal iron deficiency. The fetus has priority on available iron and is able to accumulate sufficient iron even from an iron-deficient mother.

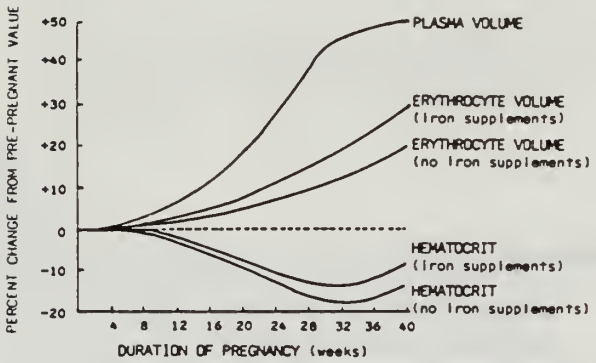
Physiological Anemia

During pregnancy plasma volume expands to meet the increased circulation needs of the highly vascular placenta and developing maternal and fetal tissue. Increased plasma is also required to eliminate waste through the kidneys and heat through the skin. Red cell count, hemoglobin, and hematocrit drop in response to the increased plasma volume.

Plasma volume begins to rise about the end of

the third month, reaches maximal levels at the 34th to 36th week, declines near term, and returns to normal 6 to 8 weeks after delivery. Erythrocyte production increases as well. The rise in erythropoiesis begins between the 16th and 24th week, increases linearly until delivery, and then declines to normal levels. Erythrocyte production does not, however, match plasma volume expansion. As a result, hemoglobin and hematocrit values drop. This "physiological anemia" is normal. The degree of change in both plasma volume and red cell volume varies from one woman to another.

Fig. 12-1. CHANGE IN MATERNAL PLASMA AND ERYTHROCYTE VOLUME AND HEMATOCRIT DURING PREGNANCY.



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Laboratory Evaluation

The anemia of pregnancy is most often the result of iron deficiency, due to high iron requirements. In most cases, initial laboratory evaluation need only include hemoglobin (Hgb) and hematocrit (Hct) determinations. For non-pregnant women, normal Hgb is 12 gm/100 ml and Hct is 38%. Women with blood values below this level in the first trimester of pregnancy should be suspected of having or developing iron deficiency anemia.

A normal drop in Hgb and Hct due to "physiological anemia" begins between the third and fifth months of pregnancy. Hgb and Hct are lowest between five and eight months and begin to increase by term. If, however, at any point in the pregnancy the Hgb falls below 11 gm/100 ml or the Hct below 33%, the diagnosis is anemia. For further determination of iron deficiency anemia, many clinics routinely use a complete blood count (CBC) which generally includes red cell indices and reticulocyte count.

Table 12-1. LABORATORY STEPS IN THE DIAGNOSIS OF IRON DEFICIENCY ANEMIA

First:	* *Hgb* and/or *Hct* determination * If results are low, repeat to rule out lab error. * If still low after repeat:
Second:	* A ***complete blood count (CBC)*** including: -reticulocyte count -peripheral blood smear and -red cell indices
Third:	* ***Serum iron*** and ***total iron binding capacity*** (TIBC) should be obtained for confirmation of diagnosis. * A low ***serum iron*** (less than 60 mcg/ml) accompanied by a high ***TIBC*** (over 300 mcg/ml or a ratio between the two ***(transferrin saturation)*** of 15% or less indicates iron deficiency anemia.
Fourth:	* ***Serum ferritin assay*** is useful in assessing whether marrow iron stores are adequate. Levels below 10-12 mcg/liter are indicative of iron deficiency and low iron stores. * This test is also helpful in differentiating iron deficiency from other microcytic anemias that resemble iron deficiency, such as thalassemia minor. * Serum ferritins pick up iron deficiency anemia in the early stages. Iron stores are depleted before a drop in Hgb and Hct is evident. * This test may not be common clinically.
Fifth:	* Diagnosis of iron deficiency can be confirmed by therapeutic trial. Proper iron therapy should result in an increase in reticulocyte count within 5-10 days, followed by a gradual rise in Hgb and Hct over a period of 4-6 weeks.

Diet and Iron Absorption

Iron is found in food in two forms: heme and non-heme. Non-heme iron accounts for 60% of the iron found in animal foods and virtually all the iron in vegetable foods. Heme iron accounts for 40% of the iron in animal foods. All iron is absorbed in the stomach and duodenum.

The amount of iron absorbed from food depends on the total iron content of the food, the amount of heme and non-heme iron present, the amount of protein and ascorbic acid eaten at the same meal, and the iron status of the individual. The presence of other substances also affects the absorption rate. The absorption rate varies from 3-20%, depending on these factors. The average absorption from all foods is about 10%.

Heme Iron: Heme iron (found exclusively in animal foods) does not interact with other substances in the diet. It enters the mucosal cells directly as hemoglobin or myoglobin. Absorption of heme iron is 5 to 10 times greater than the absorption of non-heme iron. Therefore animal tissue foods are relatively important sources of iron.

Non-heme Iron: Non-heme iron is reduced to ferrous iron and then absorbed through the mucosal cells. Absorption of ferrous iron is influenced by other components of the diet. Substances in the meal either reduce absorption by precipitating iron, or enhance iron absorption by promoting its solubility.

Protein and Ascorbic Acid: Both protein and ascorbic acid increase absorption of ferrous iron. These substances influence absorption only if they are consumed at the same time as the non-heme iron. For example, orange juice consumed at breakfast will not increase the absorption of the iron found in beans eaten at lunch.

Other Substances: Calcium salts, phosphates, phytates (in grains), tannic acid (in tea), EDTA (ethylenediamine tetraacetic acid), antacids and coffee (1) decrease iron absorption if consumed in large quantities.

Dietary iron absorption increases in an iron-deficient individual. In addition, iron absorption increases with pregnancy.

Counseling

Counseling iron-deficient women is more complex than simply providing a list of iron-rich foods. In order to help women to effectively improve their iron status, the nutritionist must counsel from the standpoint of the whole dietary intake.

The typical American diet contains approximately 6 mg iron/1000 kilocalories. At this level of iron intake, women will have difficulty meeting the extra iron demands of pregnancy. As the proportion of an individual's calories from nutrient-poor snack foods and beverages increases, iron intake (per 1000 kilocalories) decreases even further. The nutritionist must therefore counsel individuals to decrease their intake of "empty" calories and substitute foods containing nutrients (in this case, particularly iron) as well as calories.

Milk and other dairy products (cheese, yogurt) are iron-poor foods. Pregnant women should be encouraged to consume the equivalent of one quart of milk per day to meet calcium requirements, but should be discouraged from meeting their total protein requirements with dairy products.

Eggs have low iron availability and should not be recommended as a high iron food. In addition, the inclusion of eggs in the diet has been shown to interfere with absorption of iron from other foods consumed in the same meal. However, eggs should not be eliminated from the diet since they are high in protein, easy to fix and low in cost.

Because of the high absorption rate of heme iron, increased meat, fish and poultry consumption should be recommended. Liver is an excellent source of iron, but is often a poorly accepted food.

Table 12-2. GOOD DIETARY SOURCES OF IRON

Animal Foods (15 - 20% absorption)	**Iron** (mg/serving)
Beef liver (3 oz. cooked)	12.0
Chicken liver (3 oz. cooked)	9.0
Oysters (3 oz. raw)	5.5
Turkey (3 oz. cooked)	5.0
Clams (3 oz. raw)	3.5
Lean beef, pork, lamb (3 oz. cooked)	3.0
Chicken (3 oz. cooked)	2.0
Fish (3 oz. cooked)	1-1.5
Vegetable Foods (3 - 4% absorption)	**Iron** (mg/serving)
Fortified breakfast cereals (1 oz.)	10-18
Prune juice (1 cup)	10.5
Black beans (1 cup cooked)	7.9
Garbanzo beans (1 cup cooked)	6.9
Pinto beans (1 cup cooked)	6.1
Navy beans (1 cup cooked)	5.1
Soybeans (1 cup cooked)	4.9
Lima beans (1 cup cooked)	4.3
Lentils (1 cup cooked)	4.2
Spinach (1 cup cooked)	4.0
Green split peas (1 cup cooked)	3.4
Blackstrap molasses (1 tablespoon)	3.2
Fresh peas (1 cup cooked)	2.9
Beet greens (1 cup cooked)	2.8
Raisins (½ cup)	2.6
Chard (1 cup cooked)	2.6
Dates (10 medium)	2.4
Tofu (4 oz.)	2.3
Tomato juice (1 cup)	2.2
Butternut squash (1 cup baked)	2.1
Pumpkin seeds (2 tablespoons)	2.0

Some women may be wary of the possible environmental toxins and contaminants or the high cholesterol content in liver. If a pregnant woman expresses a dislike for liver, the nutritionist can suggest recipes and variety in preparing liver. The woman can also be assured that other meat alternatives are fine.

For women who have elected vegetarian diets, increased consumption of legumes will most closely approximate iron intake of meat-containing diets.

Good daily sources of vitamin C should be particularly emphasized. Citrus fruit and juice provide rich stable sources of vitamin C.

Pregnant women should be encouraged to consume whole grain products as they contain some iron. Commercially available cereals, breads, rice and macaroni products may or may not be enriched with iron. The nutritionist can counsel women to consume iron-fortified products, and provide clear instructions on reading labels. This is particularly important if the nutritionist determines a significant proportion of an individual's calories are coming from grain products. Use of actual boxes and labels is often very helpful in educating clients.

Iron Supplementation

As of 1980, the National Research Council of the National Academy of Sciences recommends that pregnant women receive an oral iron supplement delivering 30-60 mg elemental iron per day to protect pre-existing iron stores. This dose is present in most of the prenatal multivitamin/mineral supplements on the market.

Iron supplementation (in addition to the iron in prenatal supplements) is common clinical practice. Generic ferrous sulfate, available in 325 mg (5 grain) tablets, each containing 60 mg elemental iron, is the most widely used iron preparation. This is well-utilized, generally well-tolerated, and inexpensive. An appropriate prophylactic dose (after the first trimester) is one tablet daily, in addition to the prenatal vitamins.

Routine prescription of three (325 mg) iron tablets is unnecessary for women with normal Hgb and Hct indices. Such a high dose should be reserved for therapeutic treatment of iron deficiency anemia.

Compliance with taking iron supplements can be poor. The nutritionist should educate pregnant women about the importance of iron supplements. To avoid confusion, a consensus should be reached among providers in each center or office concerning the appropriate supplements.

Nutritionists should encourage women to take supplements with a good source of vitamin C - grapefruit or orange juice is often convenient.

The following suggestions may be made to increase the absorption of iron from supplements:

* Take supplements with a good source of vitamin C. Grapefruit juice or orange juice is often convenient.
* Take iron on an empty stomach. Recent studies indicate that iron absorption may be as much as 75% more when supplements are taken on an empty stomach (2).
* Recommend iron in the form of a single-nutrient supplement. Multi-vitamin/mineral supplements decrease iron absorption due to the presence of calcium carbonate, magnesium oxide, other nutrients, fillers and coatings (2).

Side Effects of Iron Supplements

Commonly reported side effects of iron supplements include constipation, diarrhea, nausea and epigastric pain. These side effects are primarily a function of the total amount of elemental iron per dose. Incidence of side effects is approximately the same in the following ferrous salts with the same elemental iron content: sulfate, fumarate, succinate, and glutamate.

If side effects do develop, several steps can be taken to alleviate them.

1. **Take supplements after meals.** Normally iron supplements are taken on an empty stomach to increase absorption. However, women complaining of side effects should take supplements right after a meal. This practice usually reduces symptoms. Taking supplements at bedtime may also help.
2. **Reduce dosage.** Begin by reducing the number of 325 mg tablets the woman takes daily. If a dosage below 325 mg (one tablet) is necessary, brand name iron preparations and liquid forms of iron contain smaller doses of iron.

   Ferrous gluconate is widely used as a supplement for women complaining of GI symptoms. They report a slightly better tolerance probably because of the lower percentage of elemental iron per dose.
3. **Constipation.** If the woman complains of constipation, standard advice for its treatment is appropriate. Most effective remedies include increasing dietary fiber, fluids (especially prune juice) and exercise. Women should also be informed that black or tarry stools are a normal result of iron supplementation.
4. **Avoid iron supplements in the first trimester.** Many women experience nausea and vomiting in the first trimester. In order to avoid any possible additional side effects, iron supplementation may be withheld until the second trimester when fetal demands for iron become significant.

Serious acute poisoning in children can result from the ingestion of doses in excess of one gram of iron. Pregnant women should be instructed to keep their iron supplements out of reach of children.

Table 12-3. COMPARISON OF SOME ORAL IRON PREPARATIONS

Preparations	Iron content mg/pill
Single agents:	
Ferrous sulfate	60
Ferrous gluconate	37
Ferrous fumarate	66
Prolonged-release or enteric-coated:	
Ferrous sulfate Enseals	66
Fero-Gradumet	105
Feosol Spansule	45
Ferro-Sequels	50
Ferronord DLA	75
Mol-Iron Chronosule	78
Combination hematinics:	
Geritol	50
Iberol	105
Perihemin	55
Trinsicon	90
Simron	10
Vitron-C	66
Ferro-Grad-500	105

American Druggist Redbook, 1975.

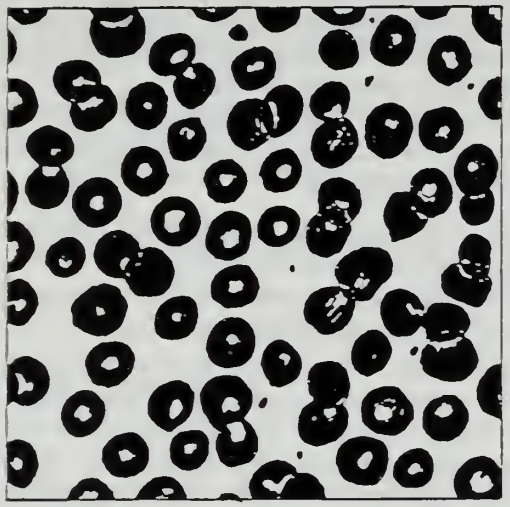
Table 12-4. IRON PREPARATIONS FOR PEDIATRIC USE* (liquid)

Chemical Designation	Iron content mg/ml	Commercial (proprietary) designation
Ferrous sulfate solution, USP	8	
Ferrous sulfate solution, concentrated	25	Fer-In-Sol
Ferrous sulfate elixir (5% ethanol)	9	Feosol elixir

*This is not a complete list of preferred iron preparations, nor does it imply endorsement of these products; other commercially available iron preparations may be equally efficacious.

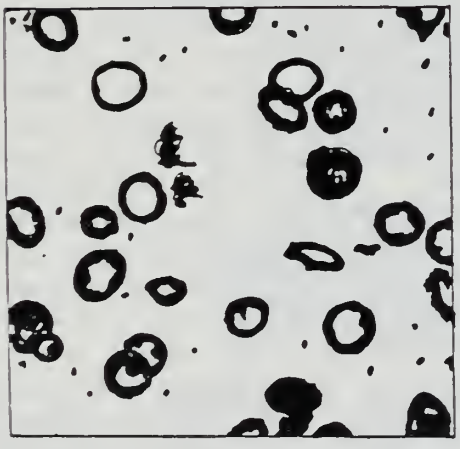
*Liquid iron available in pediatric form can be used for adult pregnant women.

Fig. 12-2. Showing pregnant women what normal and anemic blood actually looks like may be helpful in counseling.

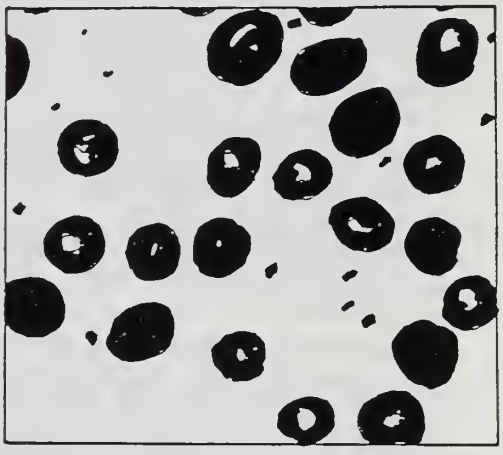


Normal Blood

Sickle Cells



Iron Deficiency Anemia



Macrocytic

(Folic Acid Deficiency)

FOLACIN DEFICIENCY

Folacin deficiency is the usual cause of megaloblastic, macrocytic anemia during pregnancy and the puerperium. Megaloblastic, macrocytic anemia designates abnormalities in the blood and bone marrow whereby erythrocytes are enlarged and have an abnormally short life span.

Serum and erythrocyte folacin levels fall, beginning about the 16th week of pregnancy, even in healthy women with adequate diets. Maternal levels fall even more sharply in women who smoke (2). Fetal levels are several times higher than maternal levels; the fetus does not seem to be deprived of folacin.

For healthy, non-smoking women, the fall in folacin may be physiological. Some studies report that 60% of women studied had low folacin levels without anemia (1). These low levels may be due primarily to expanded blood volume, since total serum folacin does not fall (12). The decrease may also be partly due to increased maternal, fetal and placental demands for folate, and increased urinary excretion of folate.

Folacin stores, located primarily in the liver, are generally sufficient for six weeks. Eighteen weeks of a folacin deficient diet is necessary for the development of megaloblastic anemia in the nonpregnant woman. In pregnancy, less time is required before anemia develops because of increased maternal requirements, increased fetal requirements, and decreased maternal absorption.

Development of megaloblastic anemia due to folate deficiency generally occurs before 30 weeks of gestation only in individuals with unusually high requirements for folate, i.e., twin pregnancies, individuals with increased red blood cell turnover, acute infections, malabsorption states, and patients taking anticonvulsant drugs.

Measurements of urine and serum levels of folate are unreliable during pregnancy. Diagnosis is best established by a diet history, a peripheral blood smear (to determine megaloblastic anemia), and an erythrocyte folate determination. Erthrocyte folate is a reflection of tissue folic acid stores, although this test is not often done clinically. Response to folate therapy establishes the diagnosis.

Dietary intake rarely meets the increased demand for folate during pregnancy. Therefore the National Academy of Sciences has recommended a prophylactic folate supplement of 800 mcg which is the RDA for pregnancy. Most prescription prenatal vitamins contain between 800 mcg and 1 mg (1000 mcg) folacin. Treatment of an established folate deficiency state requires 1 mg of folacin per day. After treatment, the best maintenance therapy is correction in the diet.

Folate deficiency has been implicated as an etiologic factor in a number of obstetrical complications, such as abruptio placentae, spontaneous abortion and prematurity. However, the relationship between the obstetric complications and folate deficiency is controversial. It is suspected that the fetus obtains adequate folate even from a deficient mother.

Two-thirds of folate-deficient pregnant women also lack iron stores and therefore a mixed anemia is relatively common.

Table 12-5. GOOD DIETARY SOURCES OF FOLACIN

FRUITS AND VEGETABLES

Within the fruit and vegetable group folacin varies widely among raw foods. These foods are lower in folacin after cooking and processing. Decreases result from both destruction of folacin by heat and by its leaching into the cooking water. Using some raw fruits and vegetables in the diet and cooking for a short amount of time in a minimum of water or steaming optimizes folacin intake.

	Total Folacin (mcg/serving)
Vegetables	
Spinach (1 cup, cooked)	164
Spinach (1 cup, raw)	106
Broccoli (1 medium spear, cooked)	101
Romaine lettuce (1 cup, raw)	98
Green peas (1 cup cooked, from frozen)	77
Cabbage (1 cup raw shredded)	69
Beets (½ cup cooked)	66
Kale (1 cup raw)	66
Tomato juice (1 cup)	63
Collard greens (1 cup raw)	56
Fruits	
Orange juice (1 cup)	136
Cantaloupe (½ medium)	82
Fresh orange (1 medium)	65
Avocado (½ medium)	59
Grapefruit juice (1 cup)	52

LEGUMES, NUTS, SEEDS

Cooked and processed legumes are good sources of folacin. Nuts and seeds contain respectable amounts of this B vitamin.

Garbanzo beans/chick peas (½ cup, dry)	200
Roasted peanuts (½ cup)	76
Almonds (½ cup)	68
Red (kidney) beans (1 cup cooked)	68
Baked pea beans (1 cup canned)	61
Pinto beans (½ cup cooked)	56
Roasted cashews (½ cup)	47
Lima beans (½ cup cooked)	41
Sesame seeds (¼ cup)	36

	Total Folacin (mcg/serving)
GRAINS	
Folacin is found primarily in the outer layers of the grain. Most baked products (breads, non-fortified cereals, dessert bakery products) are not good sources of folacin.	
Toasted wheat germ (1 oz., ½ cup)	110
Fortified breakfast cereals	
25% USRDA (1 oz. serving)	100
ANIMAL PROTEIN	
With the exception of liver, animal protein foods (meat, fish, poultry, eggs, and dairy products) are not good sources of folacin.	
Chicken liver (3 oz. cooked)	204
Pork, beef liver (3 oz. cooked)	123

For a more complete listing of folacin content of foods, refer to: **Journal of the American Dietetic Association**, Vol. 70, No. 2, February, 1977.

VITAMIN B_{12} DEFICIENCY

Vitamin B_{12} deficiency results in megaloblastic, macrocytic anemia. Vitamin B_{12} deficiency is rarely the cause of megaloblastic anemia in pregnancy because of the adequacy of B_{12} reserves and the high concentrations of vitamin B_{12} in foods of animal origin. Vitamin B_{12} is stored in the liver in sufficient quantities to sustain physiologic needs for 3 to 5 years. These stores act as a buffer against the demands of pregnancy.

Vegans, who do not eat *any* animal products in their diets, are susceptible to vitamin B_{12} deficiency. Vitamin B_{12} supplementation is recommended for them.

Pernicious anemia is caused by a lack of the intrinsic factor in gastric juice. This factor is necessary to absorb vitamin B_{12}. Pernicious anemia usually occurs in older people who have had gastric surgery or other gastric problems. Few cases of pernicious anemia have been reported in pregnancy since it rarely occurs in women of childbearing age. In any event, women with such a severe B_{12} deficiency would probably have difficulty conceiving.

Decreased serum B_{12} levels and lack of response to therapy with physiologic doses of folic acid coupled with response to B_{12} therapy are diagnostic of vitamin B_{12} deficiency.

Sickle cell anemia and thalassemia account for a small percentage of the anemias of pregnancy. These anemias are inherited disorders and are not of nutritional origin.

SICKLE CELL ANEMIA

Sickle cell disease is characterized by a genetic defect in Hgb that causes a marked reduction of solubility of Hgb in the red blood cell in the deoxygenated state. When oxygen pressure is low, the Hgb precipitates and distorts the shape of the cell. These sickle-shaped erythrocytes are rigid, interlock with each other, and produce vascular obstruction. This results in areas of ischemia which are responsible for the painful crises that manifest the disease.

Sickle cell disease is present in approximately one per 500 American blacks, and is seen less commonly among people of southern Mediterranean origin.

Complications of pregnancy occur frequently in women with sickle cell anemia. Anemia becomes more severe, reflecting the plasma volume expansion associated with pregnancy. Infections are more common, particularly pneumonia, pyelonephritis, and endometritis. These infections can precipitate sickle cell crisis. Pre-eclampsia, pregnancy-induced hypertension, congestive heart failure, and pulmonary embolus also occur more commonly.

Maternal sickle cell anemia has a deleterious effect on the fetus. The rate of abortion is increased and perinatal mortality (associated with prematurity) is increased.

Folic acid supplementation is recommended to prevent development of megaloblastic anemia. Folic acid should be given to all patients because of the constant overproduction of erythrocytes by the marrow. Iron deficiency anemia has been found to be quite rare among women with sickle cell disease and routine iron supplementation is not recommended. However, occasionally a patient with sickle cell anemia is determined to have iron deficiency anemia and usual treatment (30-60 mg elemental iron, three times a day) is recommended in these instances.

SICKLE CELL TRAIT

Approximately 10% of American blacks have sickle cell trait. Sickle cell trait is not usually associated with adverse effects on mother or fetus during pregnancy. No specific therapy is required and usual iron and folic acid supplementation is recommended. Any anemia is probably due to other factors, such as nutrition, rather than to sickle cell trait.

THALASSEMIA

Thalassemia is another inherited disorder characterized by a decrease in the amount of synthesized hemoglobin. Thalassemias are classified into two major subgroups based on the genetic defect: beta-thalassemia and alpha-thalassemia.

Beta-Thalassemia Major

Beta-thalassemia major, also known as Cooley's anemia, is a severe disorder with hypochromic, microcytic anemia, chronic hemolysis, and marked, ineffective erythropoiesis. The disorder is lethal and very few patients pass through menarche and fewer become pregnant. Pregnancy is frequently complicated by severe anemia and advanced congestive heart failure. Folic acid should be administered daily. Perinatal deaths are more frequent.

Beta-Thalassemia Minor (trait)

Beta-thalassemia minor (trait) is often asymptomatic. Pregnancy is primarily complicated by an increase in the severity of microcytic, hypochromic anemia. Because of the clinical similarities, this anemia is sometimes mistaken for iron deficiency anemia. These patients do *not* respond to iron. Folic acid supplementation is considered routine. Delivery is usually uncomplicated and birth weight is normal.

Alpha-Thalassemia Major (homozygous)

Homozygous alpha-thalassemia results in death in utero or shortly after birth. For this reason, it is rarely diagnosed. The disease is seen in Southeast Asian populations, where it is the most common form of hydrops fetalis (severe fetal erythroblastosis resulting in delivery of stillborn or death of infant shortly after delivery).

Alpha-Thalassemia Minor (heterozygous)

Assessment techniques are available in research institutions but are uncommon in most medical facilities. Family studies involving hematologic assessments are presently utilized. The incidence is thought to be quite rare and neither the mother nor the fetus is adversely affected.

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DIABETES DURING PREGNANCY 13

Nutritionists caring for pregnant women should be alert for signs of impaired carbohydrate metabolism and be knowledgeable about the diagnosis and clinical management of gestational diabetes as well as insulin-dependent (IDDM) and non-insulin dependent diabetes (NIDDM) in pregnancy. Dietary management is a major part of care in all three conditions.

CLASSIFICATION

Diabetes Mellitus During Pregnancy

Diabetes mellitus (DM) in pregnancy is classified as follows:

Table 13-1. WHITE'S CLASSIFICATION OF DIABETES MELLITUS DURING PREGNANCY (Revised) (1)

Gestational Diabetes	• Abnormal GTT; diet alone • Diet alone insufficient; insulin required
CLASS A	Diet alone, any duration or onset age
CLASS B	Onset age 20 yr or older; duration less than 10 yr.
CLASS C	Onset age 10-19 yr.; duration 10-19 yr.
CLASS D	Onset age 10 yr.; duration over 20 yr., background retinopathy or hypertension
CLASS R	Proliferative retinopathy or vitreous hemorrhage
CLASS F	Nephropathy with over 500 mg/day proteinuria
CLASS RF	Criteria for both classes R & F coexist
CLASS H	Arteriosclerotic heart disease clinically evident
CLASS T	Prior renal transplantation

All classes below A require insulin. Classes R, F, RF, H and T have no onset/duration criteria but usually occur in long-term diabetes. The development of a complication moves the patient to a lower class.

Gestational Diabetes

Gestational diabetes is identified by an abnormal glucose tolerance test (GTT) in pregnant women who have not previously been diagnosed as diabetic. Gestational diabetes most frequently appears after the twentieth week of gestation. Glucose tolerance customarily returns to normal about one week after delivery. Gestational diabetes recurs in 90% of subsequent pregnancies, and approximately 50% of women with gestational diabetes develop permanent diabetes within 15 years. Gestational diabetes usually does not require insulin therapy unless blood sugars consistently remain over 120 mg/dl two hours after meals.

Insulin-Dependent Diabetes Mellitus

Pregnant women with insulin-dependent diabetes mellitus (IDDM) are classified from class B through class T according to age of onset, disease duration, and pathology. The presence of the disease prior to and after pregnancy, the need for insulin to control blood sugar and ketosis, and the severity of the risks to the mother and the fetus differentiate the women with IDDM from most women with gestational diabetes.

Non-Insulin Dependent Diabetes

Prior to gestation, women with non-insulin dependent diabetes (NIDDM) have been treated by diet modification alone and occasionally with the use of oral hypoglycemic agents. The action of diabetogenic hormones of pregnancy may necessitate the use of insulin if blood glucose levels cannot be kept under control, since oral hypoglycemic agents are not used prenatally.

Effects of Diabetes on the Pregnant Woman and Fetus

Pregnant women with diabetes are at high risk for complications. As the woman's classification increases from class A to R, the number of potential problems increases. Women with diabetes are at higher risk for urinary tract and vaginal infections, pre-eclampsia and other hypertensive disorders. The large body size of the fetus in gestational diabetes may be increased, thus increasing the likelihood of cesarean section.

Infants born to women with DM are high risk neonates. Fetal anomalies, multiple malformations as well as single congenital anomalies of the heart, spine, and kidney occur more frequently in offspring of women with DM than in the general population (4). Fetal outcome depends on the intensity and duration of the disease as well as the degree of control over blood glucose and ketoacidosis. The incidence of anomalies increases in offspring of women with poor control of blood glucose particularly in the first ten weeks of pregnancy (3). Most anomalies occur before the forth to seventh week of gestation, during organ development (2).

Macrosomia (large body size) is a common problem in the neonates of mothers with gestational diabetes and uncomplicated diabetes of relatively short duration (e.g., White classes A, B, and maybe C) (11). Maternal hyperglycemia causes the fetal pancreas to secrete large amounts of insulin (hyperinsulinemia), which in turn stimulates excessive body growth and fat deposition in the fetus. Dehydration from increased heat and water loss from the larger body surface area is also of concern. Fetal hyperinsulinemia may also result in decreased surfactant production from the inhibition of pulmonary maturation. This disorder results in an increased incidence of respiratory distress syndrome in the neonate. When the high levels of maternal blood glucose are no longer supplied, fetal hyperinsulinemia can lead to neonatal hypoglycemia (11).

Babies born to mothers with more severe diabetes complicated by vascular pathology may be small for gestational age, presumably from decreased placental function (11).

The incidence of stillbirths to diabetic mothers increases after 36 weeks gestation. The birth must be carefully timed to protect the fetus. Many of the complications seen in infants of diabetic mothers (hypoglycemia, hypocalcemia, hyperbilirubinemia, respiratory distress syndrome and hyaline membrane disease) result from immaturity of organ systems due to an early delivery. Tests of estriol leyels, HCS, and lecithin/sphingomyelin ratios in amniotic fluid are used to time the delivery to increase the changes for the most favorable outcome.

SCREENING

Urinary Glucose

Because of the increased risks associated with uncontrolled DM during pregnancy, all pregnant women should be screened for the presence of carbohydrate intolerance. This test for urinary glucose is customarily performed at each visit by testing for urinary glucose. False positive results can be obtained:

1. with the use of a test tape non-specific for glucose. Using Testape and Clinistix will avoid positive reactions from lactose, a frequent urinary contaminant in pregnant women, and

2. because the renal threshold for glucose is lowered during pregnancy, causing women with normal blood sugar values to occasionally spill glucose.

The Clinitest 2 drop method and Chemstrip Ug are considered more sensitive to urine glucose.

Blood Glucose

Testing blood glucose levels is another method of screening for gestational diabetes and is recommended for all women between 24 to 28 weeks. A glucose load is administered which, if elevated, is followed by a three-hour glucose tolerance test (GTT) for definitive diagnosis. Women at risk include those with a history of:

1. diabetes in an immediate family member
2. previous babies over 9 lbs at birth
3. previous unexplained spontaneous abortions or fetal death
4. previous neonatal death
5. polyhydramnios (excess amniotic fluid).

Blood glucose screening includes:

1. Fasting blood glucose
2. One or two hour postprandial glucose
3. Three hour glucose tolerance test (GTT)
4. Hemoglobin A1 (3).

Glucose Tolerance Test

The glucose tolerance test is performed by obtaining a fasting blood and urine sample prior to the intake of 100 gms of glucose (commercially available, prepared as a cola-flavored beverage). Blood and urine samples are then obtained one-half, one, two, and three hours later.

Pre-test - Provided that the patient has been consuming a relatively well-balanced diet prior to the test, a minimum daily consumption of 150 grams of carbohydrate is recommended for three days preceeding the test (5).

Before the test, the patient must refrain from eating or drinking anything but water for 8-16 hours. No alcohol is permitted after the evening meal. Caffeine and nicotine are restricted prior to and during the test.

Results - The test is considered abnormal if two or more values meet or exceed the normal values for pregnancy.

Table 13-2. PLASMA (AND WHOLE BLOOD) GLUCOSE VALUES AS MEASURED BY GLUCOSE TOLERANCE TEST (IN MG/100 ML)

Fasting	1 hr.	2 hr.	3 hr.
Non-pregnant			
130 (110)	195 (170)	140 (120)	130 (110)
Pregnant			
105 (90)	190 (165)	165 (145)	145 (125)

*Whole blood glucose values are 15% lower than plasma.

Nutritional Management of Diabetes in Pregnancy

Women with diabetes should be under good control before conception. This care requires careful monitoring of all women of childbearing age with IDDM, rapid diagnosis of pregnancy, and strict management especially during the first two months of pregnancy, when most women are not yet under medical supervision (2).

Goals of therapy include maintenance of blood glucose levels near those of non-diabetic pregnant women, and avoidance of ketoacidosis. The meal pattern must be adjusted to meet the demands of insulin injections. Meals and snacks must be scheduled to cover periods of peak insulin activity to avoid both hypo and hyperglycemia. Although the fetus is quite tolerant of hypoglycemia, the pregnant woman may find it uncomfortable. Hypoglycemia can be relieved by eating fast-acting sugars which are high in nutrients, such as fruit juices and raisins.

The meal plan should be divided into three fairly equal meals with two to three snacks. Meals should not be skipped. The bedtime snack should include at least 25 gms of complex carbohydrate and 7 gms of protein to avoid overnight hypoglycemia and ketosis. Simple sugars, which rapidly supply glucose to the blood, should be avoided.

Starvation ketosis usually occurs early in pregnancy and is characterized by normal or low blood sugar levels accompanied by ketonuria. Food intake needs to be increased. Diabetic ketoacidosis characterized by elevated blood glucose together with glucosuria and ketonuria is caused by severe insulin deficiency. As acetonuria has been correlated in some studies with increased stillbirths and lowered IQ in the child (7), both are to be avoided.

Table 13-3. DIET STRATEGIES FOR THE MAIN TYPES OF DIABETES IN PREGNANCY

Dietary Strategy	Non-insulin requiring	Insulin-requiring
Calories for activity levels and normal weight gain of pregnancy	Very important	Very important
Protein (at least 1.3 gm/kg) and other nutrients	Yes	Yes
5-6 feedings/24 hours	Not crucial if average caloric intake O.K. and good blood sugars are maintained	Yes
Consistency of timing of meals	Advised practice; Precision not crucial	Very important
Day-to-day consistency of the ratios of carbohydrate, protein and fat for each of the feedings	Not crucial	Yes
Extra food for usual excercise	Very appropriate	Yes
Use of food to treat or prevent hypoglycemia	Not critical	Important
Use of pregnancy diet to teach dietary principles and form a basis of postpartum dietary control	Important	Important

Adapted from West (12).

During the first trimester, the meal pattern followed prior to pregnancy needs to be altered to accommodate the increased nutritional needs of pregnancy. Optimally, the diet should contain 12-20% of calories from protein (1.3 to 2 gms/kg/day), 50-60% from complex carbohydrate (or a minimum of 200 gms/day), and 30% from fat. Specific guidelines for the pregnant woman with DM include adding 300-400 kcal per day by the second trimester. Since diets are individualized, sources of additional calories vary according to certain factors (i.e., original meal plan, blood glucoses through day). Some guidelines include increasing the carbohydrates by 50 gms (addition of two bread or two fruit exchanges) *and* the protein intake by 30 gms (addition of two skim milk and two meat exchanges). During the first trimester, an additional 150 kcal per day is adequate. Caloric needs may be more closely calculated by using 30 calories per kilogram of ideal body weight during the first trimester, and 30-35 calories per kilogram of ideal body weight for the remainder of the pregnancy (14,15,16). Information on calculating exchange diets is available (9,10).

Weight gain should follow the curve established for non-diabetic pregnant women. Close monitoring of weight gain in mature diabetic women will enable the nutritionist to provide appropriate counseling. Many pregnant women taking insulin have difficulty pacing their weight gains. Weight loss is inappropriate in all pregnant women but especially in women with IDDM to avoid ketosis. Rapid weight gain (greater than 3 kg per month) necessitates cutting some calories from the meal plan.

The goals of dietary therapy in the patient with gestational diabetes are to supply the nutritional requirements of pregnancy and to limit the extent of hyperglycemia. As with women with IDDM, the following points need emphasis:

1. restriction of concentrated carbohydrates to avoid rapid increases in blood glucose
2. optimal weight gain for pregnancy
3. no weight loss
4. intake of adequate nutrients for pregnancy
5. equal spacing of meals and snacks to avoid hyperglycemia. Exact timing is not necessary if the woman is not on insulin.

Hyperglycemia is monitored by frequent determinations of fasting blood glucose levels. If the FBS exceeds 105 mg/100 ml, or if the two hour post prandial blood glucose is >120 mg/100 ml more than two to three times in two weeks, insulin may be required. The physician may also request Hgb A1 values to monitor blood glucose.

Postpartum Care

Nutrition care after delivery is important to help the woman adjust her meal pattern to her postpartum needs. Breastfeeding is recommended for the mother with DM as for any other woman. Her pregnancy meal pattern should be increased in calories and nutrients to include the nutritional cost of lactation.

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PICA 14

Pica, from the Latin for magpie, an omnivorous bird with mischievous habits, is the practice of eating non-food substances. Consumption of clay and dirt (geophagia), raw starch (amylophagia) and ice (pagophagia) are the most prevalent during pregnancy, but cravings for ashes, charcoal, coffee grounds, paint chips and other materials have also been noted. This practice reaches geographically around the world and historically as far back as at least the sixth century.

Cultural influences and tradition are important in the continued practice of pica. Many women feel their baby will not be normal if clay, dirt or starch are not consumed. Other reasons given for pica include relief of nausea, vomiting, dizziness, headaches and swollen legs, to help babies, and to insure beautiful children (1).

The practice of pica is passed from generation to generation. Women who ate dirt during childhood are more likely to continue eating dirt during pregnancy. Poverty undoubtedly also has an effect; most women who consume dirt or starch are poor.

In the United States pica occurs most frequently in poverty areas of the south among black women. White women also practice pica; they tend to eat coffee grounds, apple and orange seeds, ice and potato peelings. Black women are more likely to eat clay and laundry starch (2).

Pregnant women have been reported to have eaten 130 grams of clay or two pounds of starch daily. Families have mailed packages of clay and dirt considered particularly beneficial (often a fine white clay) to pregnant relatives in the north.

The etiology of pica is unclear; pica and iron deficiency seem to be related. Some evidence points to pica as a cause of iron deficiency. Several studies have shown that clay, dirt, antacids and laundry starch all inhibit iron absorption (3,4,5). However, another study demonstrates that clay and starch do not inhibit iron absorption in anemic women, suggesting that the women were anemic because clay and starch replaced iron-rich foods in the diet (6).

In other studies iron deficiency has been shown to cause pica, especially excessive ice consumption. In two studies ice consumption in women (not pregnant) disappeared with iron therapy (7,8). The craving for ice in one group of iron-deficient women disappeared before the iron had time to correct the anemia. In this case, defective activity of iron-dependent enzymes in tissues (catalase and cytochrome C) may be related to pica (8).

Pica may endanger the fetus. Intestinal and pyloric obstruction in the mother, prematurity, pre-eclampsia and prenatal mortality have been associated with pica. The incidence of pre-eclampsia

has been reported as twice as great when pica is also present (1).

In addition, when pica involves consumption of lead-containing substances such as lead paint or soil contaminated with lead, it places the mother and infant at risk for increased blood lead levels and lead poisoning. A woman who reveals such a history should be promptly referred to her physician. (See **Lead Exposure in Pregnancy**).

COUNSELING

Health care staff of the predominant culture tend to feel that pica is bizarre, in addition to being harmful. To be non-judgmental about pica requires more of an expansion of one's natural perceptions than do many other customs. In order to determine whether a woman regularly practices pica and to help her decrease or stop consumption of non-food items, the counselor must guard against any judgmental implications or tone. If the health care provider seems disapproving, the woman may be secretive about her practices.

Matter-of-fact, specific questioning is usually the best way to discover if a woman is practicing pica. "Do you crave anything in particular?" leaves open the possibility of eating a wide range of substances. This question followed by "Do you eat dirt, laundry starch, clay, etc.?" reinforces the idea that any craving is natural. Such inquiries allow the woman to respond without feeling she will be criticized or considered odd. The counselor should also try to find out the volume of non-food substances consumed since small amounts may be less cause for concern than large amounts. Several approaches to follow-up -- after determining a woman practices pica -- are listed below.

1. Solicit the woman's feelings about and reasons for practice.
2. Discuss the background and common reasons for pica, showing the woman she is not alone or unusual within her culture.
3. Present current knowledge about pica and specific suggestions for change.
   a. discuss the possible dangers of large amounts of non-food substances to the fetus.
   b. aid in planning a nutritious diet.
   c. discuss the importance of good nutrition for herself and the baby.
   d. encourage additional assistance from food stamps, WIC, or other food assistance programs.

Elimination of the practice of pica will probably occur only with the elimination of poverty and extensive health education, but substantial change can occur with effective and positive one-to-one counseling.

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Postpartum Concerns

INFANT FEEDING CHOICES

15

Breastfeeding is the ideal method of infant feeding. It provides the infant with many nutritional, immunological and psychological benefits. Recognition of these benefits has resulted in a dramatic increase in the last decade in the number of women choosing to breastfeed. The incidence and duration of breastfeeding among low income women, however, is only about half that of middle income women. It is imperative that health care professionals recognize and address the many barriers to successful breastfeeding which still exist for all women and especially for low income women.

The Massachusetts WIC Breastfeeding Study showed that women's prenatal plans regarding infant feeding correlated with their postpartum choice of feeding at hospital discharge (1). Breastfeeding education, therefore, is especially important during the prenatal period. Of course, health care professionals need to encourage and support breastfeeding in a manner that does not alienate the many women who choose to bottlefeed.

Four important points should be kept in mind when counseling pregnant women on their choice of infant feeding:

1. **ENABLE ALL PREGNANT WOMEN TO MAKE AN INFORMED CHOICE ABOUT INFANT FEEDING.**

   The role of the counselor is to provide information and address the woman's concerns and questions, to enable the woman to make a decision free from unnecessary barriers. Then the counselor should support the woman in whatever choice she makes.

2. **LOOK FOR FACTORS WHICH WILL PREDICT NURSING SUCCESS.**

While talking with pregnant women, the counselor should assess the woman's environment and personal attitudes for factors which will lead to nursing success (discussed in the next few pages of this section). If none of these factors is present, a woman may be set up for failure. Women who are convinced to nurse and fail may experience shame, guilt or unhappiness.

3. **HAVE SUPPORT AVAILABLE FOR WOMEN WHO DECIDE TO NURSE.**

Contrary to popular opinion, nursing does not necessarily come naturally. The techniques of breastfeeding have to be learned. More importantly, a new mother may need support and reassurance to feel that her experience is normal and she is nursing successfully. In addition, fatigue, tension, anxiety, embarrassment and other emotions do affect breastfeeding success. For these reasons telling a woman that breastfeeding is wonderful, convincing her to try nursing herself, and then sending her off are often not enough to assure nursing success. Any health professional doing prenatal counseling should be able to provide some means of support for the woman after the baby is born. This support could be a local group, other health professionals with nursing experience and knowledge or the counselor herself (in person or by telephone). It is important to see postpartum women as soon as possible (preferably within 2 weeks after delivery) in order to prevent or resolve any problems associated with breastfeeding.

4. **HAVE A GOOD SENSE OF WHAT BREASTFEEDING INVOLVES**

Women should know what to expect from the breastfeeding experience. Anyone doing prenatal counseling who has not breastfed should be familiar with the process of breastfeeding. Painting an idyllic picture of a contented baby nursing every three to four hours (between naps) sounds fine. However, for most babies frequent feedings (every 1½–3 hours) are necessary in the beginning to build up a milk supply. If women are not prepared for so many feedings, they may feel they have an inadequate milk supply and turn in desperation to formula.

FACTORS RESPONSIBLE FOR SUCCESS IN BREASTFEEDING

Several studies have tried to identify factors that lead to breastfeeding success. In a study done in Lexington, Kentucky, social support appeared crucial for success. "General health, career plans, diet and drug habits as well as the strength of her commitment to breastfeeding" were also important (2). A small study in Cambridge, Mass., showed that knowledge regarding breastfeeding and family or professional support were the most significant factors affecting the success of the nursing experience (3). A study done on the wives of Air Force men showed that women who did not nurse or who "failed" at nursing showed conflict over accepting their biological maternal role in relation to their infant (as opposed to other roles society offers women). (4)

Many factors affect a woman's decision to breastfeed. They include the cultural and social environment, attitude of medical providers, information available and the woman's feelings about breastfeeding.

Family Structure/Support Network

Most women are part of a family structure. Relatives have a profound effect on each woman's opinions and actions. The way a woman's own mother fed her children may be very significant in the pregnant woman's decision. Whether her partner approves or disapproves of nursing is important since nursing is difficult in the face of strong opposition from husband or boyfriend. How a woman's friends choose to feed their infants is also significant. Seeing a baby breastfeeding makes the experience real; she does not have to imagine or visualize what it would be like.

Most women in the United States live in nuclear families without the support and aid of other generations during the early weeks after childbirth. Other cultures with extended family structures provide more support for new mothers. For a period of time after childbirth, the new mother is "mothered" by another woman (usually her own mother, grandmother or aunt) who has experience in nursing and

infant care. The new mother is given reassurance and support; she learns to nurse and take care of her infant. She is not expected to cook, wash clothes or entertain guests (5). This kind of support - ideal for nursing success - is rare in our society.

Culture

Most babies were nursed until World War II. In the 1950's, with the introduction of formula, bottlefeeding became the norm. Most women had no opportunity to see babies being nursed or to learn the techniques of breastfeeding. Since the early 1970's, breastfeeding has been increasing. In 1973, 25% of all babies were breastfed (6). By 1980, approximately 60% of women were breastfeeding on hospital discharge. The rate for low income women is about 30% (7,8).

Medical Providers

Pregnant women become intimately involved with their medical providers (assuming they are receiving prenatal care). These providers - obstetricians, midwives and nurses - may share their opinions about feeding babies. Because a woman relies on her doctor to care for her during this growing time, she may be strongly influenced by his/her opinion. An enthusiastic physician dedicated to breastfeeding can influence his/her patients, especially if he/she provides information and support. A knowledgeable and supportive pediatrician to "carry the ball" after the baby is born can also be crucial for nursing success.

Often obstetricians remain neutral or silent about the issue of infant feeding. Most pediatricians are not trained to do extensive nursing counseling. If medical providers were more forthright and more supportive of nursing, more women would probably nurse.

Self-Confidence

A woman's self-confidence and attitude towards her body may affect her decision to nurse. Breast milk comes from a woman's own body. This fact is obvious, but very important. A women needs to feel that her body can actually provide for the baby. This requires some sense of confidence in her body's ability. Many women today feel there is something wrong with their bodies, especially as measured against the beauty ideals of society. This attitude may affect a woman's confidence in her ability to nurse.

Emotions

Fatigue, tension, fear, anger or embarrassment can thwart breastfeeding. How does this happen? Breastfeeding involves two distinct mechanisms. The suckling of the infant sends a message to the anterior pituitary which releases the hormone prolactin stimulating milk production in the alveoli of the mammary glands. At the same time, the hormone oxytocin is released from the posterior pituitary. The oxytocin causes the myoepithelial cells surrounding the mammary glands to contract, allowing the milk to drain (let-down) into the sinuses. The milk is then available to the infant. Tension and other emotions can interfere with the let-down mechanism. A woman who eats, drinks and rests adequately will be able to produce milk, but if she does not feel confident about putting the baby to the breast, let-down may not occur. This is why it is especially important to consider a woman's feelings about breastfeeding. Is she embarrassed at the thought of nursing? Will she be tense if others seem to disapprove? Many books on breastfeeding suggest that women lie down for five minutes before each feeding, allowing them to relax and relieve some of their daily tensions.

Information

The more accurate, understandable information a woman has about breastfeeding, the more likely she will be to try it and to succeed. Often women do not have a good understanding of the basic mechanisms of breastfeeding. Good information is available now in book and pamphlet form (see appendix). This information should be given to all women whether or not they plan to nurse.

Commitment

Personal commitment has a profound effect on a woman's ability to nurse. A woman nursing tc please someone else, or nursing because she feels she should "do the best" by her baby, despite her own desires, will probably not succeed.

Diet, Drugs, General Health

Good general health and diet promote successful breastfeeding. A woman needs to remember to care for herself (adequate rest and nutritious diet) when she has a new infant.

Most drugs pass into breast milk. Some are harmful to the infant. Sometimes nursing is contraindicated; sometimes drug substitutions are available. A woman who is nursing and using prescription, over-the-counter or street drugs needs to be under a physician's care.

Smoking and caffeine may also interfere with nursing. More than 10-20 cigarettes per day may interfere with let-down and decrease milk supply. Coffee in excess of 6-8 cups has been associated with wakeful, hyperactive babies (5).

Obviously, the choice of breast or bottle is not a simple one of choosing the best milk. All the factors discussed above should be considered by the pregnant woman and the counselor. A nutritionist cannot affect the givens in a woman's life - her

family, friends or doctor. The counselor can provide information and support so the woman can decide what is right for herself and her baby.

Career Plans, Roles

A woman planning to return to work immediately after delivery (2-4 weeks) can nurse if she has easy access to her infant or continues breast simulation by expressing milk at work.

Returning to work at 2-4 months, after nursing is established, is less of a problem. A woman can either use a breast pump or nurse in the morning and evening.

Nursing requires acceptance of the biological role of motherhood since only the mother can nurse. (After nursing is established, a bottle can be used occasionally - once a week, once a day, or more - depending on the situation). Very few women can know before the birth of their baby how the uniqueness of this role will affect them. The father can still play a full and vital role in caring for the infant and supporting the mother. However, both parents must realize the exclusivity of the nursing mother and baby especially in the early weeks. The feelings brought up by this exclusiveness are best expressed openly and discussed together.

HOW TO DISCUSS INFANT FEEDING

Obviously, the choice of breast or bottle is not a simple one of choosing the best milk. All the factors discussed above should be considered by the pregnant woman and the counselor. A nutritionist cannot affect the givens in a woman's life - her family, friends or doctor. The counselor can provide information and support so the woman can decide what is right for herself and her baby.

The nutritionist should initiate the discussion of infant feeding, since women will rarely bring up the subject themselves. Sometime during the second trimester is the best time to ask a woman about infant feeding. An initial question in the first trimester may start a woman thinking about the issue. However, during the first trimester, the pregnancy is too new for a woman to consider seriously how she plans to feed her baby. By the second trimester her pregnancy is usually accepted, she can feel the baby moving and she can begin to think about how to feed it.

An infant feeding discussion is normally free flowing. The nutritionist should try to seek out the client's concerns and at the same time assess her environment for factors which will contribute to nursing success. Listed below are important parts of such a discussion and suggested questions which may help elicit the client's feelings.

1. **Initial question:** *"How are you planning to feed your baby?"* or *"Have you given any thought to how you might feed your baby?"*

The woman may answer with definite plans to bottle feed or to breastfeed. She may be unsure. Each answer requires slightly different responses from the counselor.

If a woman definitely plans on bottle feeding, little discussion may be in order. However, one more probe may produce surprising results, since many women have thought about nursing. *"Have you ever thought about breastfeeding your baby?"* may bring forth worries, concerns or questions that lead to a productive discussion. If not, the nutritionist should accept and support the woman's decision to bottle feed and answer any questions she may have about bottle feeding.

Women who are unsure or who definitely plan to nurse require more discussion. A definite nurser, who has successfully nursed other children, may only need enthusiastic support for her decision. She may also benefit from a discussion of any changes in her life that would affect the successful nursing of this baby. (How does she feel about the reaction of the older children, for example?) Since all babies are different, women who have nursed successfully once may have different problems with a second or third baby.

A definite nurser who has never nursed before may have questions, need more information or more discussion of her support system.

A woman who is undecided requires the most discussion and information.

2. **Discussion of the woman's own feelings:** The following questions may be useful in a discussion of breastfeeding with a pregnant woman. Each factor important for breastfeeding success has a set of questions to go along with it. Answers to these questions may help the counselor get an idea of the woman's potential for breastfeeding success. If the woman wants to breastfeed, the counselor will learn what areas may need attention.

These questions are not meant to be asked one after the other, straight down the list. They can be used to initiate conversation or to deepen conversation after initial remarks by a pregnant woman. They may also be used as gentle probes. They should be used in the context of the mother's concerns. Using them effectively requires sensitivity and intuition.

Sometimes questions are used most successfully at the end of a statement. For example, instead of "*Are you worried nursing will tie you down?*" try "*Some women have told me they are afraid nursing will tie them down. Is this something that worries you?*" This approach take the burden off the woman, and can help open up a conversation on the woman's real feelings.

Table 15-1. QUESTIONS TO BE USED IN PRENATAL BREASTFEEDING DISCUSSION

Cultural Support Network

- *Did your mother nurse you or any of your brothers or sisters? How did she like it?*
- *How does your mother feel about you breastfeeding your baby?*
- *How does your partner feel about you breastfeeding the baby? Are you afraid he will be jealous?*
- *Have you ever seen a baby being breastfed?*
- *Will you have help after the baby is born?*
- *Is there anybody whom you can ask questions about breastfeeding?*
- *Have any of your friends breastfed? Did they like it?*
- *What have your obstetrician and pediatrician said about breastfeeding?*

Personal Attitude

- *How do you feel about breastfeeding?*
- *Are you worried that breastfeeding will tie you down?*

Self image/Self-confidence/Sexuality

- *Are you afraid your diet will be too restricted?*
- *Are you worried about the nutritional quality of your milk?*
- *Are you afraid you won't be able to produce enough milk?*
- *Are you afraid you won't be able to nurse, for some reason?*
- *Are you afraid nursing will make your breasts saggy, ruin your figure?*
- *Does it feel funny to imagine your breasts producing milk?*
- *Do you think you can breastfeed?*
- *Do you think breastfeeding will interfere with your sex life?*

Emotional Factors

- *Would you describe yourself as "high strung"?*
- *Does the idea of nursing embarrass you?*
- *Would you become tense if others disapproved?*
- *Is there anything about nursing that worries you, makes you tense or nervous?*
- *Are you worried about nursing in public?*

Level of Knowledge

- *Do you have any questions about breastfeeding?*
- *What have you heard about breastfeeding?*
- *What have you read about breastfeeding?*
- *Do you understand how nursing works?*
- *What would you consider the advantages and disadvantages of breastfeeding?*

Commitment

- *Would your breastfeeding the baby please someone important to you?*
- *Do you think breastfeeding is best for the baby, or yourself?*
- *Do you want to breastfeed? Why do you feel you should nurse? (or not nurse?)*

Career Plans

- *Do you plan to return to work or school? When?*
- *Do you know that breastfeeding is possible while working or going to school?*

3. **Conclusion:** After this discussion, the client and counselor should be close to some conclusion. The counselor should provide as much information as possible. If the woman decides to

nurse, the counselor should also help the woman with anything that might help her succeed. For example, if a woman really wants to nurse and her partner is dead set against it, the counselor might suggest information he could read, or other men with nursing partners he could talk with. The counselor might invite the woman's partner to join in the discussion. The counselor should also provide some positive means of support after the baby is born - either in a group or individually.

Support for a new mother is crucial. The nutritionist can be a pivotal person in a woman's support system because s/he is concerned with the vital function of feeding. Supplying information is not enough; the health professional must be warm, respectful, curious and dedicated. A nutritionist can best support a client by boosting her self-confidence. When a woman has others to believe in her, she may find it easier to believe in herself.

All women will decide how to feed their infants. Health professionals should be aware of their clients' concerns and help them consider the alternatives. Most mothers welcome information and strong support regarding their choice of infant feeding.

DECIDING TO BREASTFEED

Preparation for Breastfeeding

For women who plan to breastfeed, physical assessment of the breasts, education on prenatal breast and nipple care and nipple preparation are helpful. Although not essential, nipple preparation accustoms women to handling and touching their own breasts. However, (except in the case of flat or inverted nipples) if a woman is not interested in nipple preparation, it is not critical for nursing success.

Physical Assessment

1. Do pinch test to determine if nipples protrude, are flat or inverted. With thumb and forefinger, squeeze areola at the base of the nipple. If the nipple shrinks back into the flesh, the nipple is retracted. Check both breasts. Pinch test should be done at the first prenatal visit and at seven months.
2. Check breast texture to determine elasticity. **Inelastic breast tissue** - overlying skin is taut and firm; can't be picked up. More prone to engorgement; improved by breast massage. Close attention to engorgement prevention in early weeks is a good idea. **Elastic breast tissue** - looser overlying skin, more easily picked up.
3. Check for any breast surgery, lumps or cysts.

Education

Listed below are several methods of nipple care and preparation to use for breastfeeding counseling during the prenatal period.

Prenatal Breast and Nipple Care

1. Explain increased breast size. Breasts increase in size and weight during pregnancy. (Weight sometimes doubles.) Glandular and duct tissue increase during pregnancy in preparation for lactation. The size of the breasts before pregnancy depends on fatty tissue and has no relationship to milk producing capability. Very small breasts can produce plenty of milk.
2. Avoid using soap or drying agents on nipples. Vitamin E oil can be used on very dry nipples.
3. Wear a good supporting bra. Good support helps prevent saggy, drooping breasts. Buy one nursing bra to bring to the hospital. Wait to buy more bras since breast size will probably change after the baby is born.

Nipple Preparation (9)

1. Use milk cups for flat or inverted nipples. Start using at three months if nipples are severely retracted; at seven months if some retraction is still observed. Milk cups are two-piece plastic cups that apply steady pressure at the base of the nipple. They should be worn for progressively longer periods of time, up to 8-10 hours daily. The cup should be removed at night and for short periods of time during the day to allow air to circulate.
2. Hoffman Technique – for flat or inverted nipples. Can be done from the 7th month. Place thumbs horizontally to left and right of nipple, press down and draw thumbs away from each other. Do the same above and below nipple. Do for a few minutes, twice daily.

3. Nipple rolling - encourages nipple protrusion and suppleness. Benefits normal flat nipples. Grasp nipple between thumb and forefinger. Draw nipple outward and roll between fingers a few times. Rotate around the entire nipple. Do twice a day for a few minutes.
4. Expose nipple to air or sunlight briefly each day.
5. Allow nipples to rub against clothing. Either wear no bra or let flaps down on nursing bra.
6. Do not express colostrum since it is unknown whether there is a fixed amount or not. Save colostrum for the baby.

Beginning Breastfeeding

Health Education Associates (HEA), an information and training organization for health professionals involved with breastfeeding, has suggested four types of information mothers need to know (10).

1. Practical How-to's of Breastfeeding: how to get the baby on and off the breast, number of minutes on each side and number of nursings to be expected in 24 hours.
2. Milk Supply Information: Frequent nursing makes milk, rather than draining breasts of milk. The more you nurse, the more milk you'll have. Stimulation to the nipple produces prolactin, which produces milk. Frequent nursing and changing positions also helps avoid sore nipples.
3. Why Babies Cry: Fussy times are normal for newborns. They may not be hungry but it's fine to nurse at these times to calm the baby. Stalling the baby does not lead to a happy mother or baby. Nurse as often as you want. Nursing can be short (5 to 10 minutes).
4. Nurse Where You Are Comfortable: Nurse in a quiet spot, where relaxation is possible. Nurse in privacy if you want to. Don't be afraid to demand privacy if it makes you feel more comfortable. Sometimes breastfeeding in the same spot every time is very relaxing. A discussion of this type avoids a direct reference to let-down, which can be anxiety producing. Women often worry excessively about whether their milk is letting down; if they can concentrate on comfort and privacy they will be better off.

A "getting started" (11) talk can help immensely with the how-to's of breastfeeding. It also opens up discussion and questions. A getting-started talk, demonstrating nursing techniques with a doll, helps a woman learn what to do at the first breastfeeding. The following points can be included:

- when first nursing may occur
- getting into a comfortable position
- rooting reflex
- two fingers, make V at breast
- get as much of baby's mouth onto areola as possible
- how long to nurse
- how to burp
- 2nd breast (changing sides)
- nurse on demand.

Other information which may be helpful for prospective breastfeeding mothers includes: various personality types of newborns, elimination patterns, growth spurts, and myths and fallacies commonly held about breastfeeding. Mothers may also want to know how they can tell if their infant is getting enough milk. General guidelines are:

- 10-12 wet diapers in 24 hours
- pale urine
- weight gain pattern of 4-8 ounces per week, on the average.

Breastfeeding Diet

The major changes from a pregnancy diet are slightly increased kilocalories, increased vitamins C, A and E and slightly decreased protein. Iodine and zinc are increased to cover the amount excreted in milk. These changes are easy to incorporate into normal eating patterns, especially if the woman has already been eating an adequate diet during pregnancy.

In addition, 6-8 glasses of liquid (water, juice, soups, etc.) are recommended for the nursing mother.

Some foods seem to affect breast milk in a way which causes infants to be gassy or fussy. If a mother feels that a food has affected her infant, she should avoid it for 24 hours and see if her infant's behavior changes. There is no need for a mother to avoid foods on a routine basis.

Table 15-2. RDA'S FOR PREGNANCY AND LACTATION (WOMEN, 23-50 YEARS)

Nutrient	Pregnancy	Lactation
Energy (kcal)	2300	2500
Protein (gm)	74	64
Vitamin A (RE)	1000	1200
Vitamin D (mcg)	10	10
Vitamin E (mg TE)	10	11
Vitamin C (mg)	80	100
Folic Acid (mcg)	800	500
Niacin (mg)	15	18
Riboflavin (mg)	1.5	1.7
Thiamin (mg)	1.4	1.5
Vitamin B_6 (mg)	2.6	2.5
Vitamin B_{12} (mcg)	4.0	4.0
Calcium (mg)	1200	1200
Phosphorus (mg)	1200	1200
Iodine (mcg)	175	200
Iron (mg)	18+	18+
Magnesium (mg)	450	450
Zinc (mg)	20	25

DECIDING TO BOTTLE-FEED

For women who decide to bottle-feed, practical "how-to's" such as formula choice, preparation and feeding schedules are important to discuss. Using open ended questions like "what have you heard about bottle-feeding?" facilitates discussion by bringing out information on attitudes as well as the level of knowledge about bottle-feeding.

Formula Choice and Preparation

Iron-fortified formula is the best alternative to breast milk for infants up to one year of age. (12) Whole cow's milk is not recommended until at least six months of age because it is not well digested and is nutritionally inadequate. Use of whole cow's milk after six months of age necessitates adequate table foods and juices to ensure sufficient nutritional intake of iron and vitamin C (12,13). The recommended alternative to breastmilk, therefore, is iron-fortified formula since it helps prevent the development of iron deficiency anemia and other nutritional imbalances (14, 15).

Reviewing methods of formula preparation is crucial as it is during this time that the dangers of improper dilution and contamination occur. The costliness of formula may foster the practice of overdilution, which results in an inadequate supply of calories. Some mothers hold the belief that a more dilute formula might lessen the amount of spitting up by their infants. Excessive water intake resulting from an overdiluted mixture or substitution of water for formula (greater than 8 ounces per feeding) may result in hyponatremia, irritability, or even a coma. Formula which is too concentrated can cause diarrhea, vomiting, dehydration, and stress to the kidneys due to the high solute load (13). A practical demonstration and follow-up of mixing practices by the counselor, therefore, may help reduce the errors in dilution caused by a lack of understanding of the mixing procedures, improper measurements, or harmful beliefs (16).

Proper hygiene to prevent contamination is essential as the newborn has few defenses against common germs. Great care should be taken to keep the infant's formula as free from bacteria as possible. Refer to Table 15-3 for acceptable methods of preparation/sterilization.

Table 15-3. PREPARATION/STERILIZATION METHODS (17)

There are several acceptable methods for sterilizing bottles and preparing formula. Some of these methods include:

- **Aseptic Method** for preparing formula from concentrated liquid or powder:
  1. Wash hands before preparing formula.
  2. Wash all bottles, nipples and equipment in hot, soapy water.
  3. Squeeze water through nipple holes during washing and rinsing.
  4. Rinse all bottles, nipples and equipment with hot, clear water to remove soap film.
  5. Place clean bottles, nipples and equipment in sterilizer or deep pot. Add enough water to sterilizer or pot to cover these items.
  6. Cover sterilizer or pot. Bring water to a boil and boil for five minutes. Remove sterilizer from heat and let it cool to touch (about one hour) before removing lid. Remove equipment with tongs and place on clean towel.
  7. Boil water for formula in covered saucepan for five minutes. Remove saucepan from heat, and let cool to about 100°F (or body temperature).
  8. Wash can top with hot, clear water and rinse well.
  9. Shake can very well, then open.
  10. Measure prescribed amount of the boiled water and concentrated liquid or powder into measuring cup or bowl. (The recommended mixture is 1 part concentrated formula to 1 part water or 1 level scoop powder to every 2 fl oz. water.) Stir. If power is used, mix formula with a sterilized utensil or shake.
  11. Pour prepared formula into bottles. If using disc seals, invert nipples so that they are pointing into the bottle. Otherwise, put nipples upright on bottles and cover with nipple covers.
  12. Store bottled formula in refrigerator. Use formula prepared from concentrated liquid within 48 hours; use formula prepared from powder within 24 hours.

- **Terminal Heating Method** for preparing formula from concentrated liquid (not recommended for preparing powdered formula):
  1. Wash hands before preparing formula.
  2. Wash all bottles, nipples and equipment in hot soapy water.
  3. Squeeze water through nipple holes during washing and rinsing.
  4. Rinse all bottles, nipples, and equipment with hot, clear water to remove soap film.
  5. Wash can top with hot, clear water and rinse well.
  6. Shake can very well, then open.
  7. Measure prescribed amount of water into measuring cup or bowl.
  8. Add prescribed amount of concentrated formula to water. (The usual mixture is 1 part concentrated formula to 1 part water.) Stir.
  9. Pour prepared formula into clean nursing bottles. If using disc seals, invert nipples so that they are pointing into the bottle. Otherwise, put nipples upright in bottles and cover with nipple covers. Leave nipple collars loose on the bottles.
  10. Set bottles on rack or on cloth on bottom of sterilizer or deep pot. Add about 3 inches of water.
  11. Cover sterilizer or pot, bring water to a boil, and boil for 20 minutes. Remove sterilizer or pot from heat and let cool to touch (about one hour) before removing lid.
  12. Remove bottles from sterilizer or pot. Tighten collars and store in refrigerator. Use within 48 hours.
- **Single-Bottle Method** for preparing formula from concentrated liquid or powder:
  1. Wash hands before preparing formula.
  2. Wash all bottles, nipples and equipment in hot soapy water.
  3. Squeeze water through nipple holes during washing and rinsing.
  4. Rinse all bottles, nipples, and equipment with hot, clear water to remove soap film.
  5. Sterilize bottles, nipple units, and tongs according to the boiling (aseptic) method.
  6. Store bottles and nipple units in a convenient clean place at room temperature until ready to use.
  7. At feeding time, boil water for formula in saucepan for five minutes, then remove from heat and let cool to room temperature.
  8. Wash can top with hot, clear water and rinse well.
  9. Shake can very well, then open.
  10. Pour prescribed amount of the cooled boiled water into bottle.
  11. Add prescribed amount of concentrated liquid or powder formula to water in bottle. (The usual mixture is 1 part concentrated liquid formula to 1 part water or 1 scoop powder to every 2 fl oz. of water.)
  12. Shake well before feeding.
- **Preparing Formula from Ready-to-Use Liquid:**
  1. Wash hands before preparing formula.
  2. Wash all bottles, nipples, and equipment in hot soapy water.
  3. Squeeze water through nipple holes during washing and rinsing.
  4. Rinse all bottles, nipples, and equipment with hot, clear water to remove soap film.
  5. Wash can top with hot, clear water and rinse well.
  6. Sterilize bottles and nipples according to the boiling (aseptic) method.
  7. Store bottles and nipples in a convenient place at room temperature until ready to use.
  8. At feeding time, shake can very well, then open. Pour prescribed amount of ready-to-use formula into bottle according to the doctor's instructions.
  9. Shake formula well before feeding. If any formula is left in the can, cover, refrigerate, and use within 48 hours.

How to Bottle-Feed

Encourage a comfortable setting for feeding times. Pillows placed on the corner of a sofa or armchair provide good support for propping elbows. The mother should hold the infant closely during the feeding to foster the development of their relationship. An infant should not be left alone with a bottle as this may lead to choking.

Other tips on bottle-feeding include (13,16,17):

- Stroke the infant's cheek or lips so that s/he will instinctively turn, grasp the nipple, and begin to suckle.
- Make sure the bottle is held so that only milk, and not air, is filling the nipple and cup. Infants typically swallow some air and need to be "burped" after feeding. Holding the infant upright against the shoulder while gently patting its back helps expel swallowed air and prevents discomfort.
- The size of the nipple hole is one factor which determines the rate at which the formula flows. A large nipple hole may cause the infant to swallow a lot of air. A small opening may tire the newborn before s/he gets enough to eat. Test the appropriateness of the flow by shaking the bottle and watching to see if the formula comes out of the hole in large drops, one at a time.

- Feeding should be given "on demand." For the first month or so, the infant may indicate a need for food every two to three hours. Refer to the Infant Feeding Guide in the **Assessment Forms** section under **Appendices** for guidelines on feeding frequency and formula amounts.
- Avoid coaxing the infant to finish the bottle. Overfeeding can lead to such problems as spitting up or vomiting.
- Throw out any formula in the bottle that the infant does not finish. Formula saved for a later feeding may become contaminated.

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11. Health Education Associates: **One plan for teaching breastfeeding.** Glenside, PA, Health Education Associates, 1980.
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14. Dallman, P.: Has routine screening of infants for anemia become obsolete in the United States? **Pediatrics.** 80:3, 1987.
15. Yip, R., et. al: Declining prevalence of anemia among low income children in the United States. **Journal of the American Medical Association.** 258:12, 1987.
16. Hofvander, Y., ed.: **Maternal and Young Child Nutrition.** Paris, UNESCO, Nutrition Education Series No. 3, 1983.
17. Mead Johnson Nutritional Division: **Handbook for Mother and Child Nutrition.** Evansville, Indiana, Mead Johnson, 1987.

RESOURCES

This booklet provides step by step guidance for programs wanting to begin breastfeeding support efforts or modifying present ones.

1. Kavanaugh, P. and Kerr, N., Miara, C., ed.: **Guidelines for Initiating and Conducting Breastfeeding Promotion Contacts in Local WIC Programs.** Boston, Massachusetts WIC Program, Department of Public Health, 1987.

NUTRITION COUNSELING IN THE POSTPARTUM PERIOD

16

The postpartum period is a time of dramatic physical and emotional change for women, yet it is often treated as an afterthought in health and nutrition care. A postpartum woman has needs distinct from her infant's needs; a counseling session should allow for a discussion of her personal concerns. The emotional variations of this period are often wide-ranging, taking in extremes of high and low. A woman makes major adjustments in all aspects of her life, especially regarding her infant, her family and her self-image, during this time.

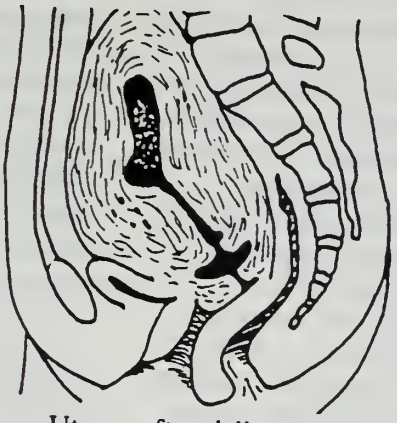
Physical and anatomical changes are significant during the postpartum period. These changes begin with delivery and continue for several weeks postpartum. They include involution of the uterus, healing of the placental site and return of the vagina, cervix and vaginal outlet to almost normal size and muscle tone. Urinary tract infections are common because of the residual effects of anesthesia, pregnancy-related changes in bladder muscle tone (overdistention and incomplete emptying) and dilation of the renal pelves and ureters. Afterpains, caused by the uterus contracting, are quite common. They are especially noticeable during nursing, usually subsiding in intensity forty-eight hours postpartum. Both lactating and non-lactating women experience changes in their breast size and shape. The abdominal wall slowly returns to its normal appearance, and with exercise, to its normal muscle tone.

In summary, during the postpartum period the body is repairing and adjusting to prepregnancy tone and appearance. Nutrition assessment and counseling can help the woman maintain her health.

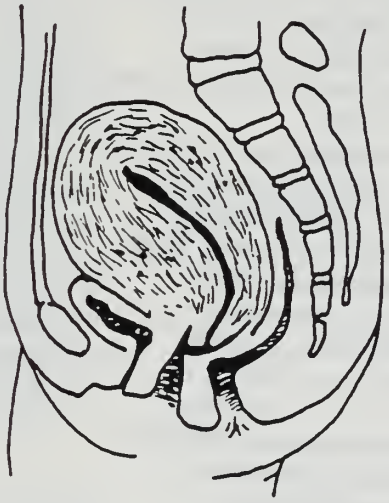
Emotional changes in the postpartum period have been divided into three stages – the immediate postpartum period, usually experienced during the hospital stay; coping with self and infant at home; and making the long-term transition to parenthood. These stages can extend to the first 12-18 months after the birth of the baby.

The nutritionist is most likely to see postpartum women in the second and/or third stage. She should keep in mind that women who have recently given birth will exhibit a wide range of feelings — from excitement to confusion and anxiety. Some women will be self-confident and competent. Others will be anxious about their ability to care for their baby. Some will be thrilled at the new addition; for others the new baby creates the need for major adjustments. Some women still want to discuss their recent labor and delivery.

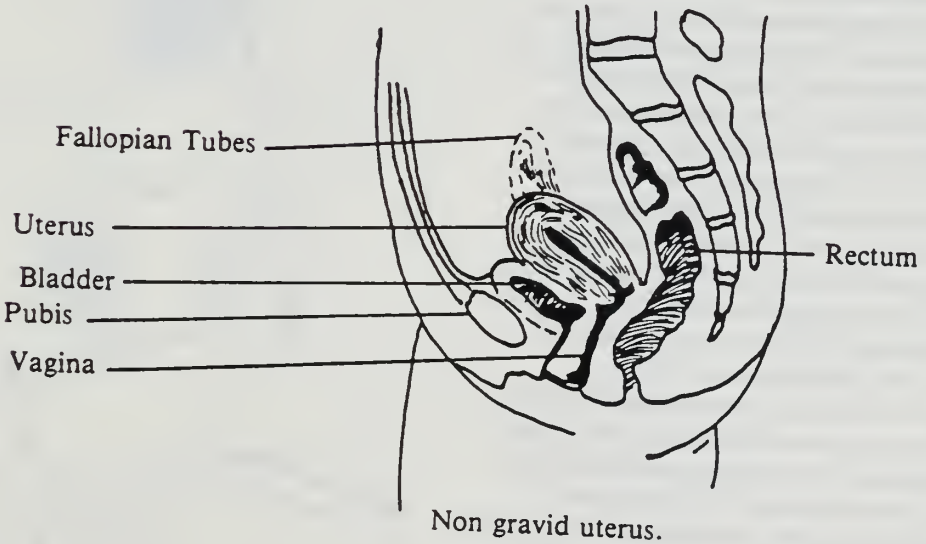
Fig. 16-1. INVOLUTION, the process by which the uterus returns to its normal pregravid state.



Uterus after delivery.



Uterus at 6th day



Non gravid uterus.

Adapted with permission from Garrey, Matthew, Govan, A.D.T., Hodge, C. and Callendar, R.: Obstetrics Illustrated, 3rd edition, Edinburgh: Churchill Livingstone.

Discussion of any of these topics serves as a conversation opener. The nutritionist may get some insight into the concerns of the new mother and how she is coping with the many adjustments she must make. In some cases, discussion of nutrition has to wait until underlying concerns are addressed. In rare cases, a woman may be referred for psychiatric/social service assistance. This is most likely to occur in cases involving neonatal loss or prolonged severe postpartum depression.

Although the focus of postpartum counseling should be the woman herself, some discussion of the infant is often appropriate. Suddenly assuming total responsiblity for a small infant can be quite overwhelming. Women may need information about normal patterns of infant growth and reassurance about the adequacy of their infant's diet. Often they just want to know that their infant is doing fine. The nutritionist may not be able to answer all these questions; referral to a nurse practitioner or pediatrician who can spend some time with a first-time mother often helps.

The nutritionist will want to discuss any or all of the following (depending on the situation of each woman) - fatigue, weight loss, appetite changes, exercise and iron-deficiency anemia. Nutrient needs - both for replenishment from the demands of pregnancy and for the special requirements of contraceptive practice - should also be discussed.

FATIGUE

Fatigue is probably the most common complaint after delivery and for three to six months postpartum. Fatigue usually results from insufficient sleep because of the baby's feeding schedule and other household/family demands, often in combination with a sleep deficit left over from pregnancy. The disturbance of sleep in the middle of a sleep cycle is especially exhausting. Life usually looks bleak on less sleep; emotional lows can often be partially cured by getting some rest. Most babies need to feed at night for a period of months; however, the ability of the baby to sleep through the night is probably one of the most significant achievements in returning the family (and especially the mother if she is doing the night feedings) to some semblance of normalcy.

The need for rest should be stressed whenever possible during the early at-home weeks. Housework and social demands should be kept at a minimum. The mother should train herself to nap when the baby naps and to sleep before attending to other tasks. Fathers should be encouraged to share as equally as possible in housework and baby care. Pediatricians or nurse practitioners may be able to help with sleep schedules, so that naps and bedtime (especially after the early weeks) are at least somewhat under the parent's control.

For mothers of several children, with or without partners, rest may be totally impossible. Often fatigue can promote or exacerbate a mild to severe anorexia among postpartum women. In some cases, excessive weight loss may result, frequently leading to further fatigue. Even when the issue of fatigue cannot be successfully addressed, anorexic women need to be encouraged to eat whatever appeals to them.

WEIGHT LOSS

Most women are concerned with losing the weight gained during pregnancy. Many want to lose weight right away. Others need time to adjust to their infant and their new life before they start to worry about their own weight. Pregravid weight, current weight and desired weight, as well as total weight gain of pregnancy, should all be considered when discussing weight loss. Maternal age and parity can affect weight status as well. Since getting out of the house can be difficult with a small infant, relative inactivity may also contribute to difficulty in losing weight.

The end of pregnancy is often a psychological starting point for women who wish to lose weight over and above that accumulated during pregnancy. A thorough discussion of sensible weight loss coupled with regular exercise must be undertaken at this time to prevent (if possible) fad or crash dieting. Many women do not consider the postpartum period as a time to replenish the stored nutrients utilized during pregnancy. They simply

want to "get back into shape". This seems particularly true with adolescents. Careful slow weight loss must be stressed with them. For women who show interest, follow-up and support are important.

Mention should be made of women who are not, for whatever reason, very interested in weight loss, even though they are habitually overweight. For these women, the discussion of weight loss must be put aside. Exercise and the quality of diet become the foci of counseling.

IRON DEFICIENCY ANEMIA

After delivery, hemoglobin (Hgb) and hematocrit (Hct) may vary considerably. Levels much below those found in early labor are an indication that much blood was lost. The most common causes of excessive blood loss are multiple fetuses and caesarean section.

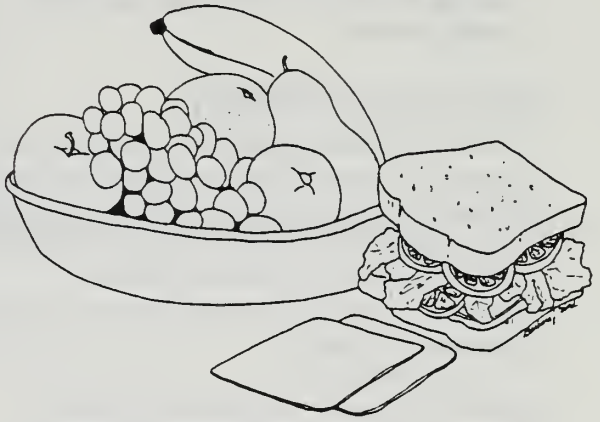
By about one week postpartum, blood volume returns to normal. If Hgb and Hct are low at this time, the woman needs counseling on intake of iron-rich foods. She probably will need supplements as well. In fact, many obstetricians encourage all women to continue prenatal supplements for the first six weeks postpartum.

A woman who was iron deficient during pregnancy may be more likely to remain anemic after delivery. Although bloodwork may not be routine at postpartum visits, these women should have their Hgb and Hct checked.

EXERCISE

Exercises to help firm up abdominal and other muscles are a good idea for postpartum women.

Examples of such exercises are available from physicians, clinics, books on childbirth preparation and the pre and postnatal care booklets distributed by many hospitals and health centers. A light, reasonable exercise regime needs to be recommended to postpartum women, with emphasis on gradually working into this regime. Exercise is very important for regaining body tone, encouraging weight loss and improving a new mother's overall spirit.



NUTRIENT NEEDS

Nutrient needs of postpartum women who do not nurse their infants are different than those of lactating or pregnant women. According to the 1980 RDA's, calorie needs decline by 300 kcal the day after delivery. Requirements for other nutrients are also lower. However, nutrient replenishment is important at this time, necessitating careful eating habits to ensure nutrient adequacy while maintaining a lower caloric intake. Food intake and dietary practices can be significantly altered after delivery by many of the factors previously discussed (fatigue, anorexia, desire for weight loss, disorganization) and may not reflect the postpartum woman's "normal" pattern at all. In such instances, follow-up at a later date is a good idea. Stressing the replenishment needs of the postpartum period as well as the relationship between diet and health may be the most appropriate action at such times.

Specific dietary instructions must reflect the woman's overall needs.

1. All women should be encouraged to eat a variety of foods, with high nutrient density.
2. Suggestions of foods that require little or no preparation are helpful for the first few months postpartum.
3. For adolescents, special attention should be paid to the growth needs of the teen herself.
4. Constipation is a common postpartum complaint. Prune juice, extra fluids and dietary fiber may help to relieve this problem. Metamucil (a dietary fiber) can be used if dietary remedies are ineffective. Exercise also helps to relieve constipation.

5. Breastfeeding women require more calories and fluids.
6. Excessive flatulence, sometimes in addition to constipation, is common after a cesarean section. Decreased fats, increased carbohydrates, small frequent meals and walking all help.
7. Women recovering from cesarean section should also be encouraged to maintain relatively high intakes of protein and vitamin C, to promote healing. Blood loss may require higher iron intakes as well.

CONTRACEPTIVES

As health professionals, nutritionists have an obligation to impress upon new mothers the possible detrimental effects of very short interconceptional periods upon herself and her children. This fact is of vital importance for adolescent mothers. Nutritionists should have family planning referral information available.

For women planning to use oral contraceptive agents (OCA), some special dietary advice is pertinent. Evidence indicates that the steroid hormones in OCA negatively affect the absorption and/or metabolism of folic acid and pyridoxine, particularly if such hormones are used for extended periods of time. Women planning to use these agents should be counseled to increase their intake of foods rich in these vitamins.

Additional nutrients have been reported to be altered in long term use of oral contraceptives. Evidence indicates a slightly increased need for vitamin C and lowered needs for iron and copper. Altered blood levels unrelated to needs have been indicated for vitamins A and B_{12}. For all nutrients, few clinical correlations of oral contraceptive use and alterations of nutrient needs have been identified in regular medical practice. No general guidelines for the use of vitamin/mineral supplements by oral contraceptive users have been developed.

Nursing women should not use oral contraceptives. Possible problems include decreased milk production, breast enlargement of male infants and additional risks to the mother.

Oral contraceptives have been found to increase blood lipids. Women with a personal or family history of high cholesterol and/or triglycerides should be advised to have a blood lipids test and to be monitored by a physician.

The intrauterine device (IUD) frequently induces a prolonged, increased menstrual blood flow. If this occurs, a daily vitamin supplement with 18 mg of elemental iron should be recommended. Normal protocol for IUD users requires a hemoglobin and/or hematocrit at the initial visit and at a six-month follow-up visit. If blood levels drop below normal, therapeutic doses of iron are recommended. In any event, all women using the IUD should be encouraged to increase their intake of dietary iron.

Unsupplemented breastfeeding may produce amenorrhea. Some women may interpret the loss of menstruation as a sign of infertility and will dispense with mechanical forms of contraception. However, lactation amenorrhea is not a reliable contraceptive method. Three to seven percent of nursing women are likely to become pregnant because ovulation will precede the first postpartum menstruation (1). Nursing women and their partners should be counseled on appropriate family planning methods.

In conclusion, mention should be made that mothering, especially with first-time mothers, is not entirely instinctual, but includes a set of learned behaviors acquired through experience. As with puberty and menopause, childbearing has been called a "maturational crisis" for women and may include "psychological disequilibrium." Many women need encouragement to realize it is alright to express the fears of inadequacy, anger, resentment and frustration they are now experiencing. It is important for them to realize that growing through this period can lead to greater emotional development, but that it does not happen overnight.

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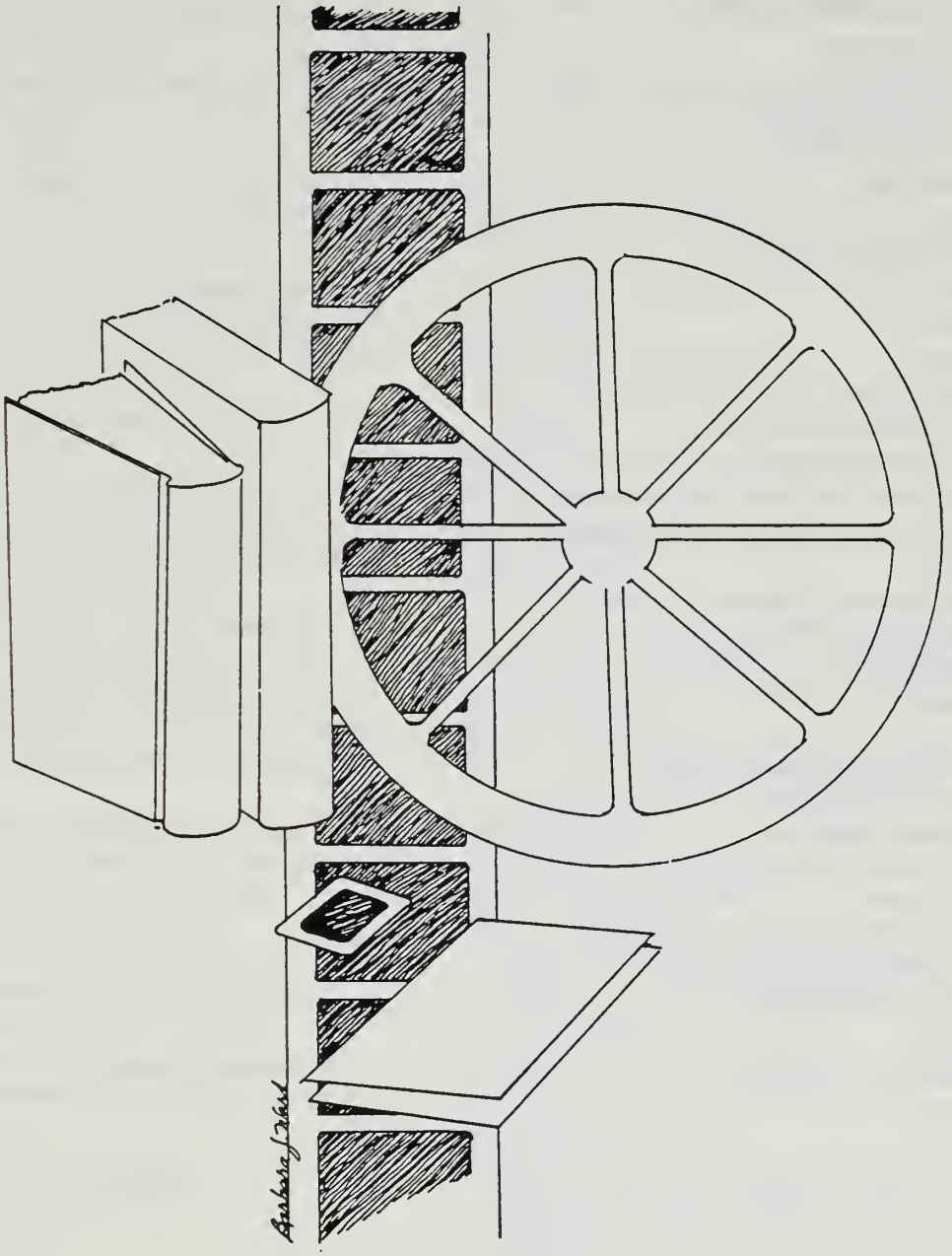
Appendices



Pregnancy
- Books
- Films and Filmstrips
- General Teaching Aids
- Professional References

Prenatal Nutrition
- Food Guides, Pamphlets and Educational Materials
- Films and Filmstrips
- Professional References

General Nutrition
- Audio-visuals
- General Teaching Aids
- USDA Publications

Vegetarianism
- Books
- Films and Filmstrips
- Pamphlets

Exercise
- Books
- Audio-visuals

Drugs, Alcohol and Smoking
- General Reference
- Pamphlets and Educational Materials

Adolescence — Pregnancy and Parenting
- Books
- Pamphlets and Educational Materials
- Professional References

Breastfeeding
- Books
- Films and Filmstrips
- Pamphlets and Teaching Aids
- Breastfeeding Aids
- Support Organizations
- Professional References
  - General
  - Influencing Breastfeeding Success
  - Prenatal Preparation

Postpartum Baby Care
- Books

Postpartum Parent Care
- Books

N.B. The following listing of resources does not constitute endorsement by the Massachusetts Department of Public Health. It is solely a list of available resources that have come to the attention of the nutritionists working in maternal health programs.

PREGNANCY

BOOKS

Alfin-Slater, R: **Nutritional Motherhood.** Van Nuys, CA, P.M., Inc., 1982. (Order: P.M., Inc., 6931 Van Nuys Blvd., Van Nuys, CA 91405 — $2.95).

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Prenatal Care, revised 1983. (in Spanish and English) Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. #017-091-00237-1 ($4.25) for English; #071-091-00209-6 ($4.50) for Spanish.

Smith, David: **Mothering Your Unborn Baby.** Philadelphia, Saunders, 1979.

Whelan, Elizabeth: **The Pregnancy Experience — A Psychological Guide for Expectant Parents.** New York, Norton, 1978.

FILMS AND FILMSTRIPS

National Health Films
Box 13973 Station K
Atlanta, GA 30324

Filmstrips for purchase; preview free. Titles include Prenatal Care, Maternal Nutrition, Postpartum Care.

Polymorph Films
118 South Street
Boston, MA 02111

A wide range of excellent films on childbirth, breastfeeding and parenting. For rent or purchase. Catalogue available.

Videograph — Childbirth Education Films
2833 25th Street
San Francisco, CA 94111

Childbirth and breastfeeding films, with black and Latin American casts. For rent or purchase.

GENERAL TEACHING AIDS

American College of Obstetricians and Gynecologists (ACOG)
600 Maryland Avenue, S.W.
Suite 300 East
Washington, DC 20024-2588

Many pamphlets on prenatal care for patient education.

American Dental Association
Order Section
211 E. Chicago Avenue
Chicago, IL 60611
(312-440-2637)

Pamphlet - Pregnancy and Oral Health. $5.00 is minimum order accepted. 25/$3.70. (3/84).

American Journal of Maternal Child Nursing
555 W. 57th Street
New York, NY 10019

Excellent journal with many articles on nutrition and prenatal care.

Arizona Department of Health Services
Office of Health Education
1740 West Adams
Phoenix, AZ 85007

Excellent prenatal education packet containing camera-ready copies of handouts: "9 Months to Get Ready."

Boston Association for Childbirth Education (BACE)
P.O. Box 29
Newtonville, MA 02160

Prepared Vaginal Birth after Cesarean and Prepared Cesarean Childbirth classes; professional training (includes certification as breastfeeding counselor), newsletter, resources. Also, 24-hour telephone counseling, monthly coffees and milk bank.

Carnation Company — Medical Department
5045 Wilshire Blvd.
Los Angeles, CA 90036

Pregnancy — in Anatomical Illustrations (25¢) illustrates stages of prenatal development. Excellent for use in counseling pregnant women.

GENERAL TEACHING AIDS (Con't)

Imprints (Birth and Life Bookstore)
P.O. Box 70625
Seattle, WA 98107

Catalogue of book ordering service. Large selection of books on pregnancy, birth and parenting.

International Childbirth Education Association (ICEA)
P.O. Box 20048
Minneapolis, MN 55420

ICEA News contains news about childbirth, prenatal and parenting issues. $5.00/year.

ICEA Review provides in-depth review of current perinatal issues.

Bookmarks is the catalogue of an extensive book ordering service. A good way to keep up-to-date on current and classic books on pregnancy, birth and parenting.

Audio-visual catalogue, Birth and Family Life 1970-1980. Lists 850 films, filmstrips, slides, videotapes. Includes rental and purchase information. $3.50 includes postage. (3/84)

Pamphlets on breastfeeding and other topics are also available.

March of Dimes
Birth Defects Foundation
1275 Mamaroneck Avenue
White Plains, NY 10605

Pamphlets, educational materials, films and filmstrips on prenatal care, birth defects, environmental hazards and genetic counseling. Many in Spanish. Catalogue describes all available materials. Some of the best include: How a Baby Grows — 4½ ft. time line of fetal development; Education kits — include books, teacher's guides and posters; Preparenthood Education Program (PEP) and Starting a Healthy Family are geared to young and schoolage parents; Inside My Mom — excellent, popular filmstrip on maternal nutrition, available in English and Spanish.

Maternity Center Association
48 E. 92nd Street
New York, NY 10028

Educational materials, pamphlets, charts and posters on prenatal development.

National Institutes of Health
NIDR, Building 31, Room 2c34
Bethesda, MD 20205

Good Teeth for You and Your Baby — Pamphlet for pregnant women. Attractive pop-art illustrations. In English and Spanish, free.

PROFESSIONAL REFERENCES

Olds, S., London, M., Ladwig, P. and Davidson, S.: **Obstetric Nursing.** Menlo Park, CA, Addison-Wesley, 1980.

Pritchard, J.A. and MacDonald, P.C.: **William's Obstetrics.** 15th edition. New York, Appleton-Century-Crofts, 1976.

Reeder, S., Mastroianni, L., Goodell, W. and Martin, L.: **Maternity Nursing.** Philadelphia, Lippincott, 1980.

FOOD GUIDES, PAMPHLETS AND EDUCATIONAL MATERIALS

Ceres Press
P.O. Box 87
Woodstock, NY 12498
As You Eat, So Your Baby Grows. A pamphlet with information on reasons for nutrient needs during pregnancy. $1.25 plus $1.00 postage and handling. Lower bulk rates. (3/84)

Dairy Bureau of Canada
20 Holly Street, Suite 400
Toronto, Ontario M4S 2E6
What Should Baby and I Eat?

Division of Nutritional Sciences
Cornell University
Ithaca, NY 14853
Teaching aids available include flip chart on nutrition in pregnancy, lesson plans to be used with paraprofessionals, handouts and slide set. Write for catalogue.

Maternal and Child Health
California Department of Health Services
714 P Street
Sacramento, CA 95814
Eating Right for Your Baby (in English and Spanish). Excellent food guide, attractively laid out, extensive lists of foods.

March of Dimes
Birth Defects Foundation
1275 Mamaroneck Avenue
White Plains, NY 10605
Recipe for Healthy Babies. Simple and colorful food guide.

New England Dairy and Food Council
1034 Commonwealth Avenue
Boston, MA 02215
Food and You — Partners in Growth. Food guide.

Nutrition Services/WIC
Vermont Department of Health
115 Colchester Avenue
Burlington, VT 05446
Eating Right During Pregnancy. Food guide in booklet form, with lists of foods in each food group.

For food guides and other general information on nutrition during pregnancy, contact your state Department of Public Health or WIC Program.

FILMS AND FILMSTRIPS

Alfred Higgins Productions
9100 Sunset Boulevard
Los Angeles, CA 90069
Healthy Mother, Healthy Baby and other nutrition films. Preview free for purchase consideration. Rentals available. Catalogue on request.

Churchill Films
662 N. Robertson Boulevard
Los Angeles, CA 90069
Mass. representative: Priscilla Forance
24 Lincoln Park
Marblehead, MA 01945
(617-639-0632)
Have a Healthy Baby, (revised, 1984); Eat, Drink and Be Wary (revised 1984); Sooper Goop; Look Before You Eat; Food and Growth. These films deal with current nutrition problems in an engaging manner.

March of Dimes
1275 Mamaroneck Avenue
White Plains, NY 10605
Inside My Mom. Excellent filmstrip with audiotape in English and Spanish. Effects of nutrition on the fetus presented in a very entertaining manner.

Modern Talking Picture Service
Film Scheduling Center
5000 Park Street North
St. Petersburg, FL 33709
Nutrition and health related films. Catalogue available.

Society for Nutrition Education
1700 Broadway, Suite 300
Oakland, CA 94612
(415-444-7133)
Great Expectations (Spanish and English) — nutrition and pregnancy. Nutritional Management of High-Risk Pregnancy — focusing on diabetes, adolescence and pre-eclampsia.

PROFESSIONAL REFERENCES

American College of Obstetricians and Gynecologists. **Nutrition in Maternal Health Care.** Order from ACOG, 600 Maryland Avenue, S.W., Suite 300 East, Washington, D.C. 20024-2588.

American College of Obstetricians and Gynecologists. **Assessment of Maternal Nutrition.** Order from ACOG.

Barnes, L.A. and Pitkin, R.M.: Symposium on nutrition. **Clinics in Perinatology.** 2:2, 1975 (out of print).

Beal, Virginia: **Nutrition in the Life Span.** New York, John Wiley and Sons, 1980.

Luke, Barbara: **Maternal Nutrition.** Boston, Little Brown and Co., 1979.

National Research Council. **Laboratory Indices of Nutritional Status During Pregnancy.** Washington, D.C., National Academy of Sciences, 1978. #0-309-02729-2. $9.25. Order from Printing and Publishing Office, NAS, 2101 Constitution Ave., Washington, D.C. 20418.

National Research Council. **Maternal Nutrition During Pregnancy.** Washington, D.C., National Academy of Sciences, 1978. #309-01761-0. $8.25. Order from Printing and Publishing Office, NAS.

National Research Council. **Recommended Dietary Allowances.** Ninth edition. Washington, D.C., National Academy of Sciences, 1980. #0-309-02941-1. $6.00. Order from Printing and Publishing Office, NAS.

National Technical Information Service. **Nutritional Supplementation and the Outcome of Pregnancy.** Springfield, VA, NTIS, 1971. Order from NTIS, 5285 Port Royal Road, Springfield, VA 22151. NTIS Accession No. PB 221-623. $16.00 prepaid.

Society for Nutrition Education. **Nutritional Management of High Risk Pregnancy.** Oakland, CA, SNE, 1981. Order from SNE, 1700 Broadway, Suite 300, Oakland, CA 94612. $5.00.

Society for Nutrition Education. **Pregnancy and Nutrition — A Bibliography.** Oakland, CA, SNE, 1981. Order from SNE. $4.00.

Worthington-Roberts, B., Vermeersch, J. and Williams, S.R.: **Nutrition in Pregnancy and Lactation.** 2nd ed. St. Louis, C.V. Mosby, 1981.

Maternal and Child Health, California Department of Health Services, 714 P Street, Sacramento, CA 95814. Series of excellent professional monographs:

- **Breastfeeding: Its Role in Infant Growth and Development.**
- **Dangers of Drinking Alcohol During Pregnancy.**
- **Food Guides: Their Development, Use and Specific Changes for Nutrition During Pregnancy and Lactation.**
- **Nutrition During Pregnancy and Lactation.** An excellent resource, including guidelines for nutrition management, evaluation tools, food guides and ethnic diets.
- **Nutrition Management of Obese Pregnant Women.**

GENERAL NUTRITION

AUDIO-VISUALS

Churchill Films
662 N. Robertson Boulevard
Los Angeles, CA 90069
Mass. representative: Priscilla Forance
24 Lincoln Park
Marblehead, MA 01945
(617-639-0632)

Films available on current nutrition problems. Eat, Drink and Be Wary (revised, 1984); Sooper Goop; Look Before You Eat; Food and Growth.

Oryx Press
2214 North Central at Encante
Phoenix, AZ 85004

Audio-visual Resources in Food and Nutrition
Volume 1 (1973-1978)
Volume 2 (1979-1983)
Each catalogue is $38.50, plus postage and handling. An updated listing of all audio-visual materials is available from:

Food and Nutrition Information Center
National Agricultural Library Building
Room 304
Beltsville, MD 20705

Society for Nutrition Education
1700 Broadway, Suite 900
Oakland, CA 94612
(415-444-7133)

Audio-visuals for Nutrition Education — revised 1979.

Sunburst
Room GL 12
Pleasantville, NY 10570

Health and nutrition filmstrips for preview and purchase.

GENERAL TEACHING AIDS

New England Dairy and Food Council
1034 Commonwealth Avenue
Boston, MA 02215

Many educational materials and films. Catalogue available upon request. Also available are:
Food Models — life-size cardboard models of different foods. Nutrient and caloric information printed on back — 146 models — $17.00; 58 models — $5.00.
Comparison Cards — bar graphs illustrating nutrient profiles of various foods — 60 cards — $6.00.

HELPFUL USDA* PUBLICATIONS

Nutrition and Your Health — Dietary Guidelines for Americans — USDA — Home and Garden Bulletin, No. 232. Explanation of the Joint USDA-DHHS dietary guidelines.

Ideas for Better Eating: Menus and Recipes to Make Use of the Dietary Guidelines. Science and Education Administration/USDA.

Food — Home and Garden Bulletin No. 228 — Science and Education Administration, Stock No. 001-000-03881-8. Colorful booklet includes updated basic four and additional information on fat, sugar, cholesterol, breakfast, snacks.

The Hassle Free Guide to a Better Diet — USDA/Science and Education Administration, No. 567 — updated basic four.

Building a Better Diet — USDA/Food and Nutrition Service Program Aid No. 1241 — updated basic four.

These can be obtained free by calling USDA: 202-447-4111. They can also be obtained from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

* United States Department of Agriculture

VEGETARIANISM

BOOKS

Ewald, Ellen: **Recipes for a Small Planet.** New York, Ballantine, 1973.

Lappé, Frances Moore: **Diet for a Small Planet.** New York, Ballentine, 1971. Cookbook, includes excellent information on protein combinations.

Robertson, L., Flinders, C. and Godfrey, B.: **Laurel's Kitchen.** New York, Bantam, 1978. Cookbook and handbook for vegetarians.

Schwartz, D.: **Vegetable Cookery — a Selected Annotated Bibliography.** New York, 1978. Available from Council on Botanical and Horticultural Libraries, New York Botanical Garden, Bronx, NY 10458. $2.50. An extensive annotated bibliography of vegetarian cookbooks.

Vegetarians and Vegetarian Diets. Revised 1978. An annotated bibliography available from Society for Nutrition Education, 1700 Broadway, Suite 300, Oakland, CA 94612.

White, Alice and the Society for Nutrition Education: **The Family Health Cookbook.** New York, David MacKay Co., 1980.

FILMS AND FILMSTRIPS

Bullfrog Films
Oley, PA 19547
Films and videocassettes
Diet for a Small Planet
Living the Good Life
Potatoes
Earthbread
The Vegetarian World

The Polished Apple
3742 Seahorn Drive
Malibu, CA 90265
Filmstrip — Vegetarianism in a Nutshell.

PAMPHLETS

Bureau of Nutrition
Department of Health
93 Worth Street, Room 714
New York, NY 10013
The Vegetarian Follows the Star. Send a stamped (40¢), self-addressed envelope for single copy.

New England Dairy and Food Council
1034 Commonwealth Avenue
Boston, MA 02215
Vegetarian Nutrition

Nutrition Services
Bureau of Health Education
Allegheny Health Department
311 Ross Street
Pittsburgh, PA 15219
Food and the Expectant Vegetarian Mother

EXERCISE

BOOKS

Bing, Elisabeth: **Moving Through Pregnancy.** New York, Bobbs-Merrill, 1975.

Bing, Elisabeth: **Six Practical Lessons for an Easier Childbirth.** New York, Bantam, 1969.

Dilfer, Stahmann, Carol: **Your Baby, Your Body: Fitness During Pregnancy.** New York, Crown Publishers, 1977.

Noble, Elizabeth: **Essential Exercises for the Childbearing Year.** Boston, Houghton-Mifflin, 1982.

Simkin, Diana: **Complete Pregnancy Exercise Program.** New York, New American Library, 1980.

AUDIO-VISUALS

BABES (Bay Area Birth Education Supplies)
59 Berens Drive
Kentfield, CA 94904
(415-456-9181)

Pre- and Post-Natal Exercise — cassette and wall chart. $13.00, also sold separately. (3/84)

GENERAL REFERENCE

Alternative Dietary Practices and Nutritional Abuses in Pregnancy. Washington, DC, National Academy Press, 1982.

Baker, Charles (pub.): **Physicians' Desk Reference.** 35th edition. Oradell, NJ, Medical Economics Co., 1981.

Benowicz, Robert: **Non-Prescription Drugs and Their Side Effects.** New York, Grosset and Dunlop, 1977.

Benowicz, Robert: **Non-Prescription Drugs and Their Side Effects.** New York, Grosset and Dunlap, 1977.

Graedon, Joe: **The People's Pharmacy I, II.** New York, Avon, 1980.

Griffenhogen, G.B.: **Handbook of Non-Prescription Drugs.** 6th edition. Washington, D.C., American Pharmaceutical Association, 1977.

Haire, Doris: **How the FDA Determines the Safety of Drugs — Just How Safe is "Safe"?** Order from National Women's Health Network, 224 7th Street, S.E., Washington, D.C. 20003, or American Foundation for Maternal and Child Health, 30 Beekman Place, New York, NY 10022. $1.50 (3/84).

Long, James: **The Essential Guide to Prescription Drugs.** Revised edition. New York, Harper and Row, 1980.

United States Pharmacopoeial Convention, Inc.: **United States Pharmacopoeia,** Easton, PA, Mack Printing Co., 1980.

PAMPHLETS AND EDUCATIONAL MATERIALS — ALCOHOL

National Council on Alcoholism
733 Third Avenue
New York, NY 10017
Distributes a wide variety of information on alcohol abuse.

National Clearinghouse for Alcohol Information
Box 2345
Rockville, MD 20852
Distributes many educational materials including: Alcohol and Your Unborn Baby. DHEW Pub. (ADM) 78-521, PH90. Fourteen-page pamphlet with information on alcohol and pregnancy. Should I Drink? DHHS Pub. (ADM) 80-919, PH164. Concisely written and attractively short and simple, with excellent information.
For health professionals:
Preventing Fetal Alcohol Effects: A Practical Guide for OB/GYN physicians and nurses. DHHS Pub. (ADM) 81-1163, Order #SP2400, 1981.

Nutrition Today
Box 1829
Annapolis, MD 21404
"Fetal Alcohol Syndrome" by Frank Iber. Appeared in Nutrition Today, Sept./Oct 1980. A teaching aid article; reprints available.

National Institutes of Health (NIH)
NIH News Branch Building 31, Room 2B-10
Bethesda, MD 20205
Free fact sheets, available in Spanish. Pregnancy and Your Drinking: For Your Baby's Sake, and What You Should Know About Drugs.

Eunice Kennedy Shriver Center
Fetal Alcohol Syndrome Program
200 Trapelo Road
Waltham, MA 02254
Publishes pamphlet, Do You Remember When You Had Your First Drink? You Might Have Had Your First Drink Before You Were Born...

March of Dimes
1275 Mamaroneck Avenue
White Plains, NY 10605
Pamphlets — Drugs, Alcohol, Tobacco Abuse During Pregnancy; Pregnant? Before You Drink, Think...

PAMPHLETS AND EDUCATIONAL MATERIALS — SMOKING

American Cancer Society
247 Commonwealth Avenue
Boston, MA 02116
(or your local cancer society)
Why Start Life Under A Cloud? — pamphlet and poster

American Lung Association
1740 Broadway
New York, NY 10019
(or your local lung association)
Smoking and the Two of You — pamphlet

ASH
2013 H Street, NW
Washington, DC 20006
ASH — Smoking and Health Review — newsletter on smoking issues

Center for Health Promotion and Environmental Disease Prevention
Massachusetts Department of Public Health
150 Tremont Street
Boston, MA 02111
Smoking During Pregnancy — pamphlet

H. Ou, Editor
NIH News Branch Building 31
Room 2B-10
Bethesda, MD 20205
Smoking; No Better Time to Quit — fact sheet. Free — available in Spanish.

US Public Health Service
Office of Assistant Secretary for Health
Office on Smoking and Health
Pub. No (PHS) 79-59969
Pregnancy and Infant Health — pamphlet

ADOLESCENCE — PREGNANCY AND PARENTING

BOOKS

Bell, Ruth, et.al.: **Changing Bodies, Changing Lives: A Book for Teens on Sex and Relationships.** New York, Random House, 1980.

Lewis, Howard and Lewis, Martha: **The Parents' Guide to Teen-age Sex and Pregnancy.** New York, St. Martin's Press, 1980.

PAMPHLETS AND EDUCATIONAL MATERIALS

Caring Mother's Coop
Box 211
Tuckertown, NJ 08087

The First Gifts — a practical information pamphlet on teenage pregnancy (two volumes, $1.25 each). Posters (fetal growth, stages of labor and health prevention) and educational games (Stepping Stones to Birth, Stepping Stones to Parenting and Nutrition Rummy) are also available.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Food for the Teen-Ager and After Pregnancy (revised 1982) #017-026-00103-4 $4.50, or $90.00/100. (4/84)

PROFESSIONAL REFERENCES

Adolescent Perinatal Health — A Guidebook for Service. Available from American College of Obstetricians and Gynecologists, 600 Maryland Avenue, S.W., Suite 300 East, Washington, D.C. 20024-2588.

Barr, Linda and Monserrat, Catherine: **Working with Childbearing Adolescents — A guide for use with "Teen-age Pregnancy: A New Beginning."** Albuquerque, New Futures, 1980.

International Childbirth Education Association, **Maternal-Child Health Care for the Young and the Poor: A Preview of Problems, Programs and Possibilities for the 80's.** Order from ICEA, Box 20048, Minneapolis, MN 55420.

Mahan, L. and Rees, J.: **Nutrition in Adolescence.** St. Louis, Times Mirror/Mosby College Publishing, 1984.

McAnarney, E.: **Premature Adolescent Pregnancy and Parenthood.** New York, Grune and Stratton, 1983.

Moore: Kristin, et.al.: **Teen-age Motherhood: Social and Economic Consequences.** Washington, D.C., Urban Institute Press, 1979.

BREASTFEEDING

In 1985, the WIC Program nutrition staff developed a method to evaluate nutrition education materials that are used for breastfeeding promotion, education and support. The criteria defined were: 1) Sponsor Bias or Promotion; 2) Content; 3) Readability; 4) Stereotyping and 5) Format. The materials were found to be either minimally acceptable, adequate or superior. The notations that follow in the Pamphlets section and the Films and Filmstrip section are taken from this evaluative book called E.M.P.O.W.E.R. (Evaluating Materials to Promote Optimal use of WIC Education Resources). The entire E.M.P.O.W.E.R. book is available from the State of Massachusetts Bookstore or by contacting the WIC Program at the Massachusetts Department of Public Health.

BOOKS — RECOMMENDED READINGS FOR PARENTS, PROSPECTIVE PARENTS AND HEALTH CARE PROVIDERS

Brewster, D.: **You Can Breastfeed Your Baby. . . Even in Special Situations.** Emmaus, PA, Rodale Press, 1974. (Order: Rodale Press, 33 East Minor Street, Emmaus, PA 18049.)

Eiger, M. and Olds, S.: **The Complete Book of Breastfeeding.** New York, Workman Publishing Co., 1972.

Ewy, D., and Ewy, R.: **Preparation for Breastfeeding.** New York, Doubleday and Co., Inc., 1975.

Gerard, Alice: **Please Breastfeed Your Baby.** New York, Signet Books, 1972.

Kitzinger, Sheila: **The Experience of Breastfeeding.** New York, Penguin, 1980.

La Leche League: **The Womanly Art of Breastfeeding.** Franklin Park, IL, Interstate Publishers, 1972.

Montague, Ashley: **Touching, The Human Significance of Skin.** New York, Columbia University Press, 1971.

Pryor, Karen: **Nursing Your Baby.** New York, Harper and Row Publishers, 1973.

Raphael, Dana: **The Tender Gift: Breastfeeding.** Englewood Cliffs, NJ, Prentice Hall, Inc., 1973.

Rice, I.: **Heart Start: A Practical Guide To Breastfeeding.** St. Paul, MN, Irene Rice (2392 Nancy Place, St. Paul, MN), 1977. Also available from ICEA.

Walker, Marsha and Driscoll, Jeanne: **Breastfeeding Your Baby**, 2nd edition. Wayne, NJ, Avery Publishing Group, 1978. (Order: Nursing Mothers' Council, Box 29, Newtonville, MA 02160. $2.50)

FILMS AND FILMSTRIPS

Educational Graphic Aids
7762 Brentwood Cove
Arvada, CO 80005
(303-424-5221)

Preparation for Breastfeeding
Rental: $20.00

Health Education Associates
211 South Easton Road
Glenside, PA 19038

Learning about Breastfeeding
Understanding Breastfeeding
Slide sets: $19.95 each.

March of Dimes Birth Defects Foundation
1275 Mamaroneck Avenue
White Plains, NY 10605

Outside My Mom: The Story of a Breastfed Baby
Color slides or filmstrip with audio-cassette; $25.00 slides; $15.00 filmstrip
Synopsis: A six-month-old infant narrates his experiences with breastfeeding. The filmstrip covers: 1) getting started 2) basic physiology of lactation and 3) establishing lactation. Advantages of breastfeeding, modesty, and uncertainty about choosing to breastfeed are discussed. Correct positioning, diet, and solutions to common problems are touched on.
Recommended Usage: This is a superior filmstrip which can be used with all pregnant women or new parents. It can encourage parents who have already decided to breastfeed and help them establish successful lactation. It can also effectively assist in motivating the undecided woman.

Motion, Inc.
3138 Highland Place, NW
Washington, DC 20008
(202-363-9450)

Breastfeeding: A Special Closeness
Rental: $40.00 for three days
Purchase: $375.00 for 16mm, video cassette or super 8
Synopsis: This film covers deciding to breasteed, the common fears and anxieties new parents may have, incorporating nursing into your everyday life and eliciting the support of others. Common problems and complications are discussed. The benefits of breastmilk for the baby are emphasized. Eating right during lactation and managing a job while breastfeeding are covered.
Recommnended Usage: This film is adequate for use with with a WIC audience who is either undecided about or planning to breastfeed. It can help to motivate a woman to breastfeed. It does not focus on technique as much as the decision to breastfeed.

FILMS AND FILMSTRIPS (Con't)

Breastfeeding, A Practical Guide, Part 1: Preparing for Breastfeeding
Rental: $40.00 for three days
Purchase: $295.00 for 16mm or video cassette
Synopsis: A prenatal parent's group, led by a counselor, discusses: 1) getting ready for parenthood 2) how the breasts make milk 3) frequency of nursing 4) diet and 5) avoiding common breastfeeding problems. A mother is shown putting her baby to the breast after delivery.
Comments: The film uses some technical vocabulary. The tone is slightly academic. There is no minority representation. All the couples are middle class, white and married. Husbands are very involved.
Recommended Usage: This film would be best used with a white, middle class, well educated group. It is minimally acceptable for a WIC audience because of the vocabulary. The film is intended for women who have decided to breastfeed and want to learn how to prepare for it.

Breastfeeding, A Practical Guide, Part 2: Managing Breastfeeding
Rental: $40.00 for three days
Purchase: $295.00 for 16mm or video cassette
Synopsis: This film addresses getting acquainted with the baby. It primarily focuses on problems such as engorgement, cracked nipples, mastitis and leaking. Nutrition during lactation is discussed. Getting milk to flow and having enough milk are touched on. A woman is shown using a poor model of a breast pump. A brief section is devoted to sexuality, nursing in public and involving the father in the breastfeeding experience.
Comments: The film uses some technical vocabulary. Minority groups are well represented but the married couple lifestyle prevails.
Recommended Usage: Like Part 1, this film is geared toward a well motivated, educated, middle income population. It is only minimally acceptable for a WIC audience. The film is intended for women who have decided to breastfeed and want to learn more about managing different breastfeeding situations or for new parents trying to work out their breastfeeding problems.

New Orleans Video Access Center
2010 Magazine Street
New Orleans, LA 70130
(504-524-8626)

Breastfeeding
Purchase: $190.00 for 16mm or video cassette
Synopsis: The first part of this presentation is a 30-second public service announcement for breastfeeding. The breast is renamed the "Sitco" infant feeder, always clean, complete and ready to go. The second part is a 4 minute spot on the advantages of breastfeeding. A black mother who had breastfed her two children discusses bonding and the ease, convenience and economy of breastfeeding.
Recommended Usage: This is a superior film which can be used with all WIC audiences to introduce them to breastfeeding and help motivate them to choose the breastfeeding option. Because of the short length, it would be a good opener for a discussion group. Nutritionists will have to develop their own questions and activities, as the presentation does not come with a teacher's guide.

Perennial Education, Inc.
477 Roger Williams
Highland Park, IL 60035

Bond of Breastfeeding
Rental: $30.00

Photoview Instructional Aids
27935 Roble Alto
Los Altos Hills, CA 94022

Breastfeeding Series
Purchase: $45.00 for slides and script

The Polished Apple
3742 Seahorn Drive
Malibu, CA 90272
(213-459-2630)

Nutrition for the Newborn, Part 1: Breastfeeding
35 mm slide set or filmstrip with audio cassette
Purchase: $99.57 for slide set
Synopsis: This filmstrip discusses the advantages of breastfeeding (e.g., nutrients, digestibility, protection against allergies, helpful for weight control, convenience and bonding). It also brings out the disadvantages of breastfeeding (e.g., mother cannot be away from baby for extended periods of time; mother is never sure how much milk baby is getting; sore nipples and breast infections). Detailed information about diet during lactation and the effects of alcohol, smoking and medicines on breastmilk is provided. How to breastfeed and ways to maintain successful breastfeeding are not addressed.
Comments: The disadvantages as well as the advantages of breastfeeding are discussed. The pros and cons of bottle feeding are not discussed. Minorities and other lifestyles/cultures are minimally represented.
Recommended Usage: This filmstrip is adequate. It is best used with an audience who is already motivated to breastfeed and interested in diet during lactation. It would not be useful to motivate the undecided woman or teach people how to succesfully breastfeed.

FILMS AND FILMSTRIPS (Con't)

Polymorph Films, Inc.
118 South Street
Boston, MA 02111
(617-524-2004)

Breastfeeding: Prenatal and Postpartal Preparation
Rental: $45.00

Talking about Breastfeeding
Rental: $30.00
Purchase: $295.00 for 16mm film

Learning to Breastfeed
Rental: $40.00 for one day
Purchase: $395.00 for 16mm film

Synopsis: This film relates the unique qualities of breastmilk. It suggests ways to ensure successful nursing. It shows babies being put to the breast and discusses supply and demand feeding. Information on preventing and treating problems such as engorgement, sore nipples and flat nipples is given.

Comments: The film is slightly disorganized. It jumps from subject to subject then back. There is a handbook for mothers to help explain the key points in the film. Minorities are not represented. Men are all husbands with wedding rings. A nipple shield and poor breast pump model are used.

Recommended Usage: This film is minimally acceptable for WIC audiences. It is best used with a group who has already decided to breastfeed, as it is not particularly motivating.

Texas Department of Health
Contact: Holeman Photo Labs, Inc.
919 W. 12th Street
Austin, TX 78703
(512-472-6113)

The Missing Milk Caper
Purchase: $26.24 for 35mm slide set with audio-cassette

Synopsis: Two breastfeeding detectives uncover the causes of and solutions to common breastfeeding problems. The slide set addresses why some mothers feel they don't have enough milk and stop breastfeeding before they had planned to. Correct positioning, adequate emptying of breasts and frequent feedings are emphasized. Throughout the presentation, mothers are encouraged to continue breastfeeding even when they have problems.

Comments: The purpose of the presentation is confusing at first, but becomes clear as the filmstrip progresses. The dialogue is quickly paced, which makes comprehension slightly difficult, especially when seeing the presentation only once.

Recommended Usage: The Missing Milk Caper is an adequate slide/tape presentation. It is best used with an audience that has already decided to breastfeed because it focuses primarily on the possible problems associated with breastfeeding. The presentation would not motivate a woman to try breastfeeding. It adequately covers information on problem solving and if possible, should be shown to the audience twice.

Videographs
2833 25th Street
San Francisco, CA 94110

Dar Pecho
Rental: $25.00
Purchase: $195.00 for 16mm film
$150.00 for video cassette

PAMPHLETS AND TEACHING AIDS

Baylor College of Medicine
1200 Moursand Avenue
Room 176B
Houston, TX 77020

Breastfeeding, Baby's Best Start. Spanish/English pamphlet.

Childbirth Education League of Monterey Peninsula
P.O. Box 6628
Carmel, CA 93921

Breastfeeding 1:1 Counseling Handbook $5.00 (includes mailing). Write to above address c/o Carole Erickson.

Cornell University
Media Services Printing
B-10 MVR Hall
Ithaca, NY 14853

The Basics of Breastfeeding: A Mother's Guide. Six-pamphlet series to help pregnant, low income women decide whether to breastfeed or bottlefeed. Spanish available. Single copy of each is $2.50/set.

Becoming a Nursing Team
16 pp booklet
English
Cost: $3.75/package of 10

Synopsis: This booklet is part of a series of six. It covers:

1. How often to nurse
2. How long to nurse at each feeding
3. How to tell if the baby is getting enough
4. How to make sure that you have enough milk
5. Diet during lactation.

Smoking, drinking alcohol and taking drugs while breastfeeding are discussed. Some of the common breastfeeding problems are addressed. Different breast pumps are explained as well as ways to store expressed milk.

PAMPHLETS AND TEACHING AIDS (Con't)

Comments: The reading level is 8th grade, which may be difficult for a WIC audience.
Recommended Usage: This booklet is minimally acceptable for WIC participants. It can be used with an audience with a high reading level, who has decided to breastfeed and wants to know about techniques for successful breastfeeding management.

Bottle or Breast
8 pp. booklet
English
Cost: $3.25/package of 10

Synopsis: This booklet is part of a series of six. It covers advantages of bottlefeeding:
1. Fathers involvement
2. Ability to separate from baby
3. Mothers can smoke or drink alcohol without fear of harming the baby.

It also covers advantages of breastfeeding:
1. Breastmilk has the proper nutrients
2. A breastfed baby is less likely to become obese later in life
3. Protects against allergies and infections.

The disadvantages of bottle feeding are not provided.
Comments: The reading level is 8th grade. This may be difficult for some WIC audiences.
Bottle feeding benefits are listed before breastfeeding benefits. No negative aspects of bottle feeding are presented.
Recommended Usage: This booklet is minimally acceptable for use with a WIC audience because of the high reading level.

Have you Decided
8 pp. booklet
English
Cost: $3.25/package of 10

Synopsis: This booklet is part of a series of six. It covers the benefits of bottlefeeding:
1. Comfortable and convenient for some mothers
2. Mother is tied down less

It also covers the benefits of breastfeeding:
1. Return to pre-pregnancy shape faster
2. Usually costs less
3. More convenient for some mothers
4. A special closeness with baby.

It is emphasized that both breast and bottlefeeding are acceptable choices and the decision depends on how the mother feels and which method is best suited to her.
Comments: The reading level is 8th grade, which could be difficult for wome WIC audiences. The information is printed on a dark green paper, making the print slightly difficult to read. Bottle feeding benefits are listed before breastfeeding benefits. No negative aspects of bottle feeding are presented.
Recommended Usage: This booklet is minimally acceptable for use with a WIC audience because of the high reading level.

Making and Giving Milk
8 pp. booklet
English
Cost: $3.25/package of 10

Synopsis: This booklet is part of a series of six. It covers the making of milk; anatomy and physiology of the breast, giving milk and the let-down reflex. Colostrum is explained. It is emphasized that to make more milk the baby needs to suck more.
Comments: The reading level is 7th grade which is acceptable but may be difficult for some WIC audiences.
Recommended Usage: This booklet is adequate for use with participants who have already decided to breastfeed. It is best used with people who are interested in how the breast functions and where the milk comes from. It does not cover positioning or common problems.

Mother's Milk — Some Special Extras
8 pp. booklet
English
Cost: $3.25/package of 10

Synopsis: This booklet is part of a series of six. It discusses the unique ingredients in human milk. It is stated that breast milk is *probably* the best food you can feed your baby for at least the first 4 to 6 months of life. Protein, fat, iron, milk, sugar, vitamins and minerals in breastmilk are explained.
Comments: The reading level is 9th grade. This will be difficult for most WIC audiences. The information is printed on a dark blue paper, making the print more difficult to read. One statement: "That breast milk is *probably* the best food you can feed your baby," is weak. It should be: "Breast milk is the best food for your baby."
Recommended Usage: This booklet is minimally acceptable for use with a WIC audience because of the high reading level. It could be used with an audience with a high reading level, and interested in knowing more about the constituents of breast milk.

PAMPHLETS AND TEACHING AIDS (Con't)

Health Education Associates, Inc.
211 South Easton Road
Glenside, PA 19038

Pamphlets, wall charts, books, rental breast pumps, training programs for breastfeeding counseling. Two pamphlet series are Adjusting to Parenthood and Breastfeeding. A sample of all 23 pamphlets costs $3.50 (3/84)

Breastfeeding: Those First Weeks at Home
6 pp. pamphlet
English
Cost: $.10 each or 100/$10.00

Synopsis: This pamphlet discusses managing breastfeeding after you leave the hospital. It explains how to tell if your baby is getting enough, comforting the baby, and avoiding sore nipples. It also covers what to do iwth a colicky baby or a sleepy baby, and what to do if you want to go out.

Comments: The reading level is 7th grade. This is acceptable, but may be difficult for some audiences. The print is small and difficult to read. Color is not used.

Recommended Usage: This pamphlet is adequate for use with a WIC audience. The audience should be motivated to learn and be interested in managing breastfeeding.

Breastfeeding Problems Can Be Avoided
11 pp. pamphlet
English
Cost: $.20 each or 100/$20.00

Synopsis: This pamphlet discusses how to avoid painful, sore nipples by proper positioning, routine breast care, and short frequent nursings. Ways to avoid engorgement and plugged ducts are also offered. What to do for flat or inverted nipples and leaking is addressed.

Comments: The reading level is 8th grade, which may be difficult for some WIC participants. There is an absence of color. No minorities are represented in the photographs.

Recommended Usage: This pamphlet is minimally acceptable for use with WIC audiences because of the high reading level. It could be used with an audience with a high reading level.

Fathers Ask: Questions About Breastfeeding
6 pp. pamphlet
English
Cost: $.10 each or 100/$10.00

Synopsis: This pamphlet is directed to fathers of breastfed babies. It explains how breastfeeding works and what the father can do to help. It encourages the participation of the father in the breastfeeding experience.

Comments: The reading level is 8th grade, which may be difficult for many audiences. There is no minority representation in illustrations. The print is small and difficult to read. There is an absence of color.

Recommended Usage: This pamphlet is minimally acceptable for a WIC audience because of the difficult reading level. It can be used with an audience with a high reading level.

Nursing is Easy When You Know How
6 pp. pamphlet
English and Spanish
Cost: $.10 each or 100/$10.00

Synopsis: This pamphlet discusses how to nurse and when to nurse. It explains how to tell if your baby is getting enough. When to give your baby a bottle is also addressed. The supply and demand concept is emphasized.

Comments: The reading level is 6th grade, acceptable for most WIC audiences. Color is not used in this pamphlet.

Recommended Usage: This pamphlet is adequate for use with WIC audiences who have already decided to breastfeed and want to know basic information about how to go about it. Positioning and problem solving are not covered.

Time Out For Breastfeeding Mothers
11 pp. pamphlet
English
Cost: $.20 each or 100/$20.00

Synopsis: This pamphlet covers reasons for choosing to breastfeed, the importance of short frequent feedings and how to tell if the baby is getting enough. Suggestions for working mothers who want to breastfeed are offered. When and how to introduce a bottle and ways to express and store milk are covered.

Comments: The reading level is 10th grade. This is difficult for most WIC audiences. The print is small and hard to read. There is an absence of color.

Recommended Usage: This pamphlet is minimally acceptable for a WIC audience because of the high reading level.

Health Education Services
P.O. Box 7126
Albany, NY 12224

Distributes health education materials produced by New York State. Attractively done breastfeeding manual, posters and pamphlets are available.

Health Services and Promotion Branch
Health and Welfare Canada
Ottawa, Ontario K1A 1BA
Canada

Breastfeeding 1981. Educational packet contains two dact folders, two journal reprints and 8½ x 11 color poster.

PAMPHLETS AND TEACHING AIDS (Con't)

La Leche League International
9616 Minnesota Avenue
Franklin Park, IL 60131-8209

Catalogue available of breastfeeding pamphlets.
Bi-monthly breastfeeding journal available.

Massachusetts WIC Program
150 Tremont Street
Boston, MA 02111
(617-727-6876)

Thinking About Breastfeeding
8 pp. pamphlet
English, Spanish, Cambodian, Vietnamese and Laotian
Cost: Free to Massachusetts WIC and MCH programs. Single copies free to other WIC/MCH programs.
Synopsis: This pamphlet, narrated by a baby and mom, discusses why breastfeeding is best. Many common questions on the following topics are answered:
1. Breast size
2. Having enough milk
3. Soreness
4. Breastfeeding after a C-section
5. Smoking and alcohol use
6. How to tell if baby is getting enough
7. Nursing in public.

Diet duirng lactation and combination bottle and breastfeeding are addresssed.
Comments: The reading level in this pamphlet is 7th grade. This is acceptable but could be difficult for some audiences. The paper used is light weight and print can be seen from one side of the page to the other. The handprinting is acceptable but is slightly hard to read and gives an overly informal, less credible impression.
Recommended Usage: This pamphlet is adequate for use with WIC participants who are undecided or plan to breastfeed. It can assist the nutritionist in motivating women to breastfeed.

Breastfeeding: Getting Started
4 pp. pamphlet
English, Spanish, Cambodian, Vietnamese, Laotian, Portuguese and Chinese. Cost: Free to Massachusetts WIC and MCH programs. Single copy free to other WIC/MCH programs.
Synopsis: This pamphlet is designed to help women initiate successful nursing practices. It suggests what to do while in the hospital and at the first feeding. Information is provided on the following topics:
1. How to breasteed
2. How often to nurse
3. Positioning
4. How to tell if baby is getting enough.

What to expect in the first few weeks and when to offer a bottle are addressed.
Comments: The reading level is 7th grade. This is acceptable, but may be slightly difficult for some audiences. The paper used is light weight and print can be seen from one side of the page to the other.
Recommended Usage: This pamphlet is adequate as a guide to successful breastfeeding in the early weeks. It provides practical information to the audience interested in the mechanics of breastfeeding.

National Child Nutrition Project
101 North 33rd Street
Philadelphia, PA 19104
(215-662-1024)

A Mother's Guide To Breastfeeding
20, 8½'' x 11'' information sheets
English/Spanish
Cost: Information Sheets $ 3.75 — 1 set of 20
$ 33.00 — (10 sets)
$ 75.00 — (25 sets)
$120.00 — (50 sets)
Single sheets may be copied with author's permission.
Synopsis: These materials are color-coded into four sections. Each section is meant to be used during a particular time in a women's prenatal or postpartum experience.
Blue sheets (1-5) are designed to be given out and used in the early and mid-prenatal period. They cover the following issues:
Sheet 1: Benefits of breastfeeding
Sheet 2: How to care for the breasts before the baby comes
Sheet 3: What to do for flat or inverted nipples
Sheet 4: What type of birth control to use while breastfeeding
Sheet 5: Whom to call if you have questions
Yellow sheets (6-11) are designed to be given out and used in the later prenatal or early hospital period. They cover the following issues:
Sheet 6: What to expect in the hospital
Sheet 7: What to expect the first time you breastfeed
Sheet 8: How to start nursing
Sheet 9: How to hold the baby while breastfeeding
Sheet 10: How often to nurse, how long to nurse at each feeding
Sheet 11: Should you give formula while breastfeeding
Green sheets (12-16) are designed to be given out and used in the postpartum period. They cover the following issues:
Sheet 12: What to eat while breastfeeding

PAMPHLETS AND TEACHING AIDS (Con't)

Sheet 13: What to do when you can't feed your baby
Sheet 14: Where to get breastfeeding supplies
Sheet 15: How to wean your baby
Sheet 16: How to start the baby on solid foods

Gray sheets (17-20) are also designed to be given and used in postpartum period. They cover the following issues:

Sheet 17: What is breast engorgement and what to do for it
Sheet 18: What are sore nipples and how to treat them
Sheet 19: What are cracked nipples and what to do for them
Sheet 20: What are clogged milk ducts and how to treat them

These sheets can be used and ordered separately in sections, or in the 20-sheet package.

Comments: The reading level is 7th grade for all sections. This is acceptable but may be difficult for some WIC audiences.

Recommended Usage: These superior information sheets can be used separately, or in sections, according to the needs and interests of the target audience. They are more informative than motivating.

Nursing Mother's Council, Inc.
P.O. Box 50063
Palo Alto, CA 94303

Many excellent, detailed pamphlets. Send for list of publications. Bulk order discounts. Also, 1 free copy of each pamphlet with self-addressed, stamped (37¢) business envelope.

Nursing Mothers' Council - Boston Association for Childbirth Education (BACE)
Box 29
Newtonville, MA 02160

Books, counseling training program
Breastfeeding Your Baby. Wayne, NJ, Avery Publishing, 1981. $2.50

Christine Prebel, R.N.
3785 Whitney Place
Duluth, GA 30136

Breast model for demonstration. $12.00 postpaid (3/84).

Publication Center
Bureau of Community Health Services
5600 Fishers Lane
Rockville, MD 20857

Breastfeeding. Limited supply of free pamphlet. Larger quantities available from: Government Printing Office, Washington, D.C. 20402, #80-017-026-0084-4, $2.25 each.

State of New Mexico
Nutrition Section, Health Services Division
Health and Environment Department
P.O. Box 968
Santa Fe, NM 87504-0968
(505-984-0030)

Breastfeeding
Cost: $.45 per pamphlet
English and Spanish

Synopsis: This pamphlet contains practical suggestions to help mothers succeed in breastfeeding. It discusses:

1. Breastfeeding in the hospital
2. Positioning
3. Frequency of nursing.

Advice on alleviating sore nipples, swollen breasts and leaking is offered. Diet during lactation and contraception is covered. Information for the working mother and nursing in public is provided.

Comments: The reading level is 10th grade. This is difficult for a WIC audience.

Recommended Usage: This pamphlet is most appropriate for an audience with a high reading level that has decided to breastfeed.

Think About Breastfeeding Now
Cost: $.15 per pamphlet
English/Spanish in same pamphlet

Synopsis: This pamphlet discusses why breastfeeding is best for the baby and for the mother. It covers the protective qualities of breastmilk and the way breastfeeding helps the mother get back in shape. The ease, convenience and economy of breastfeeding are also mentioned.

Comments: The reading level is 8th grade. This is difficult for a WIC audience. The paper quality is acceptable but a semi-gloss finish is used.

Recommended Usage: This pamphlet is most appropriate for an audience with a high reading level that is undecided about or contemplating breastfeeding.

BREASTFEEDING AIDS

Milk Cups: for management of flat or inverted nipples, engorgement, relactation, or induced lactation.

Childbirth Education Association of Greater Philadelphia
5 East 2nd Avenue
Conshohocken, PA 19428

Confi-Dri-Cups — $2.50 per cup (3/84)

La Leche League International
9616 Minneapolis Avenue
Franklin Park, IL 60131-8209

Breast Shell Kit; Breast shields for inverted nipples; Medela Supplemental Nutrition System for relactation

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Health Education Associates, Inc.
211 South Easton Road
Glenside, PA 19038
Hobbitt Shields — for sore and inverted nipples

Monterey Laboratories, Inc.
P.O. Box 15129
Las Vegas, NV 89114
Free and Dry Cups

Netsy Co.
34 Sunrise Avenue
Mill Valley, CA 94941-3398
Nesty Swedish Milk Cup and Breast Shield, $9.39/set includes mailing. (3/84)

Parmics, Inc.
1878 S. Redwood Road
Salt Lake City, UT 84104
O-cal-ette cup

BREAST PUMPS

Egnell, Inc.
765 Industrial Drive
Cary, IL 60013
(800-323-8750 or IL 312-639-2900)
Electric pump and hand pump. Egnell will provide a list of local suppliers.

Evenflo Products Co.
771 North Freedom Street
Raveena, OH 44266
Evenflo pump. Available at Sears, Roebuck Co. and some pharmacies.

Happy Family Products, Inc.
12300 Venice Boulevard
Los Angeles, CA 90066
Kaneson Breast Feeding System; Happy Family Breast Pump. Available by mail order.

Lopuco, Ltd.
1615 Old Annapolis Road
Woodbine, MD 21797
(301-489-4949)
Loyd-B or Lopuco Breast Pump, $40.00, includes shipping. (1/84)

Childbirth Education Association of Greater Philadelphia
5 East 2nd Avenue
Conshohocken, PA 19428
Gentle Expressions — battery-operated hand pump; mail order.

LACT-AID NURSING TRAINER

Resources in Human Nurturing International
Box 6861
Denver, CO 80206
Available by mail order

Nursing Mothers' Association of Australia
P.O. Box 231
Nunawading, Victoria 3131
"NMAA Supply Line" — similar to Lact-Aid. $12.00, plus $4.00 air mail. (3/84)

Many of these aids are available on a rental basis from local support groups. In the Boston area the Nursing Mothers' Council of BACE rents most of the above aids. Most medical plans reimburse for purchase price of Loyd-B pump.

SUPPORT ORGANIZATIONS

Breastfeeding Information Services
10952 Templeton Drive
Philadelphia, PA 19154

C/Sec, Inc.
22 Forest Road
Framingham, MA 01701
(617-877-8266)

Fathers and Mothers Learning Through Education and Experience (FAMLEE)
Box 15
Telford, PA 18969

International Childbirth Education Association
P.O. Box 20048
Minneapolis, MN 55420

La Leche League International
9616 Minneapolis Avenue
Franklin Park, IL 60131-8209
(312-455-7730, 24-hour hotline)

National Organization of Mothers of Twins Clubs, Inc.
5402 Amberwood Lane
Rockville, MD 20853
(301-460-9108)

Nursing Counselors of the Childbirth Education League of the Monterey Peninsula
305 Bishop Avenue
Pacific Grove, CA 93950

Nursing Mothers Committee of the Childbirth Education Association of Greater Philadelphia
5 East 2nd Avenue
Conshohocken, PA 19428

Nursing Mothers' Council of the Boston Association for Childbirth Education (BACE)
P.O. Box 29
Newtonville, MA 02160

Resources in Human Nurturing International
P.O. Box 6861
Denver, CO 80206

Health Education Associates
211 South Easton Road
Glenside, PA 19038

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PRENATAL VITAMIN/MINERAL SUPPLEMENTS

Massachusetts Department of Public Health
Maternal and Child Health Section
150 Tremont Street
Boston, MA 02111

Prepared By:

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Prenatal Vitamin/Mineral Supplements

Massachusetts MCH and WIC Programs

April 1987

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INTRODUCTION

This booklet, **Prenatal Vitamin/Mineral Supplements**, is designed to be helpful in making recommendations to patients and clients regarding appropriate supplementation during the prenatal period. The booklet contains vitamin/mineral content and percent of RDA for prescription and over-the-counter vitamin supplements. The information is presented in tables for easy use.

Following is a brief description of each table in the booklet:

- **Vitamin/Mineral Content of Selected Prescription Prenatal Supplements** (Table 1). This list contains the brand names and the content of preparations listed in the 1985 Physicians Desk Reference, 1985-1986 American Druggist Blue Book, and from a 1985 survey of selected Massachusetts pharmacists who indicated the most commonly prescribed prenatal vitamins. A prescription is required for preparations containing 1000 mcg or more of folic acid. The spreadsheet format is used so a quick comparison can be made among supplements.
- **Percent of RDA of Selected Prescription Supplements** (Table 2). The RDA values used are for adult women during pregnancy. Values are not included for breastfeeding women.
- **Vitamin/Mineral Content of Over-The-Counter Prenatal Supplements** (Table 3). This chart contains the brand names and vitamin/mineral contents of various preparations. Prescriptions are not required for prenatal vitamins containing less than 1000 mcg of folic acid. Sources used include the 1985 Physicians Desk Reference, the 1985-1986 American Druggist Blue Book, and a 1985 survey of selected pharmacists in Massachusetts.
- **Percent of RDA of Selected Over-The-Counter Supplements** (Table 4). The RDA values used are for adult women during pregnancy. The purpose of this table is to allow for a quick comparison among the various supplements.
- **Recommended Dietary Allowances** (RDA), 1980 revision, from the Food and Nutrition Board, National Academy of Sciences, National Research Council. The RDA's have been revised approximately every five years since they were first published in 1943. The most recent revision was published in 1980. Drug manufacturers are required to use United States Recommended Dietary Allowances (U.S.RDA) rather than RDA's as a standard for comparison. Thus, the values presented in this booklet may differ from values presented in the Physicians Desk Reference (PDR). U.S. RDA's were developed in 1974 to use for labeling purposes.

ALL PRESCRIPTION PRENATAL VITAMIN SUPPLEMENTS ARE COVERED BY MEDICAID AND THROUGH THE HEALTHY START PROGRAM.

Vitamin/Mineral Content of Selected Prescription Prenatal Supplements

TABLE 1

PRESCRIPTION REQUIRED (≥1000MCG FOLIC ACID)

	VIT A I.U.	VIT D I.U.	VIT E I.U.	VIT C MG	B-1 MG	B-2 MG	NIACIN MG	B-6 MG	B-12 MCG	FOLATE MCG	Ca MG	IODINE MCG	IRON MG	Mg MG	Cu MG	Zn MG	PANTO MG	
RDA FOR ADULT PREGNANCY	5000	400	15	80	1.5	1.6	16	2.6	4	800	1200	175	18+	450	2-3	20	4-7	COMPANY
ADEQUATE IMPROVED	6000	400	30	60	1.1	1.8	15	2.5	5	1000	125		65					ORTEGA
FAMPREN FORTE	4000	400		100	2	2	10	0.8	8	1000	200	150	60			15		F.A. MITCHELL CO, INC
FILABON FORTE	8000	400	45	90	2	2.5	30	3	12	1000	300	200	45	100				LEDERLEE
FILABON F.A.	8000	400	30	60	1.7	2	20	4	8	1000	250	150	45	100				LEDERLEE
MATERNA 1-60	8000	400	30	100	3	3.4	20	4	12	1000	250	300	60	25	2	25		LEDERLEE
MISSION PRENATAL Rx	8000	400		240	4	2	20	20	8	1000	175	300	60		2		10	MISSION
MISSION PRENATAL HP	4000	400		100	5	2	10	25	2	1000	50		39					MISSION
NATABEC Rx KAPSEALS	4000	400		50	3	2	10	3	5	1000	240		30					PARK DAVIS
NATACOMP-FA	4000	400		100	3	2	10	5	5	1000	250	NA	40	NA	NA	NA	10	TRIMEN
NATAFORT FILMSEAL	6000	400	30	120	3	2	20	15	6	1000	350	150	65	100		25		PARK DAVIS
NATALINS Rx	8000	400	30	90	2.6	3	20	10	8	1000	200	150	60	100	2	15	15	MEAD JOHNSON
NESTABS FA	8000	400	30	120	3	3	20	3	8	1000	200	150	37			15		FIELDING
NIFEREX-PN	4000	400		50	3	3	10	2	3	1000	125		60			20		CENTRAL PHARMACEUTICALS
NU-IRON V TABS	4000	400		50	3	3	10	2	3	1000	125		60					MAYRAND
OMNINATAL TABS	8000	400	30	90	2.5	3	20	10	8	1500	200		60		NA	NA	15	DELTA
PAR-NATAL-Rx REV	6000	400	30	60	1.1	1.8	15	2.5	5	1000	125		65					PARMED
PRAMET F.A.	4000	400		100	3	2	10	5	3	1000	250	100	60		0.15		0.92	ROSS
PRAMILET F.A.	4000	400		60	3	2	10	3	3	1000	230	100	40	10	0.15	tr	1	ROSS
PRENATE 90 TABS	8000	400	30	200	3	3.4	20	20	12	1000	250	150	90		2	20		BOCK
SECRAN PRENATAL	8000	400	30	60	1.7	2	20	2.5	8	1000	250		60					SCHERER
STUART NATAL 1+1	8000	400	30	90	2.5	3	20	10	12	1000	200	150	65	100				STUART
ZENATE	5000	400	30	80	3	3	20	10	12	1000	300	175	65	100		20		REID PROVIDENT

Blank spaces indicate 0 amount

N Not available

Percentage of RDA of Selected Prescription Prenatal Supplements

TABLE 2

PRESCRIPTION REQUIRED (≥1000mcg FOLIC ACID)

RDA FOR ADULT PREGNANCY	VIT A I.U. 5000	VIT D I.U. 400	VIT E I.U. 15	VIT C MG 80	B-1 MG 1.5	B-2 MG 1.6	NIACIN MG 16	B-6 MG 2.6	B-12 MCG 4	FOLATE MCG 800	Ca MG 1200	IODINE MCG 175	IRON* MG 18+	Mg MG 450	Cu○ MG 2-3	Zn MG 20	PANTO□ MG 4-7	COMPANY
	%	%	%	%	%	%	%		%	%	%	%	%	%	%	%	%	
ADEQUATE IMPROVED	120	100	200	75	73	113	94	96	125	125	10	0	217	0	0	0	0	ORTEGA
FAMPREN FORTE	80	100	0	125	133	125	63	31	200	125	17	86	200	0	0	75	0	F.A. MITCHELL CO
FILABON FORTE	160	100	300	113	133	156	188	115	300	125	25	114	150	22	0	0	0	LEDERLEE
FILABON F.A.	160	100	200	75	113	125	125	154	200	125	21	86	150	22	0	0	0	LEDERLEE
MATERNA 1-60	160	100	200	125	200	212	125	154	300	125	21	171	200	6	100	125	0	LEDERLEE
MISSION PRENATAL Rx	160	100	0	300	267	125	125	769	200	125	15	171	200	0	100	0	250	MISSION
MISSION PRENATAL HP	80	100	0	125	333	125	63	962	50	125	4	0	130	0	0	0	0	MISSION
NATABEC Rx KAPSEALS	80	100	0	63	200	125	63	115	125	125	20	0	100	0	0	0	0	PARK DAVIS
NATACOMP-FA	80	100	0	125	200	125	63	192	125	125	21	NA	133	NA	NA	NA	250	TRIMEN
NATAFORT FILMSEAL	120	100	200	150	200	125	125	577	150	125	29	86	217	22	0	125	0	PARK DAVIS
NATALINS Rx	160	100	200	113	173	188	125	385	200	125	17	86	200	22	100	75	375	MEAD JOHNSON
NESTABS FA	160	100	200	150	200	188	125	115	200	125	17	86	123	0	0	75	0	FIELDING
NIFEREX-PN	80	100	0	63	200	188	63	7	75	125	10	0	200	0	0	100	0	CENTRAL PHARMACEUTICALS
NU-IRON-V TABS	80	100	0	63	200	188	63	77	75	125	10	0	200	0	0	0	0	MAYRAND
OMNINATAL TABS	160	100	200	113	167	188	125	385	200	188	17	0	200	0	NA	NA	375	DELTA
PAR-NATAL-Rx REV	120	100	200	75	73	113	94	96	125	125	10	0	217	0	0	0	0	PARMED
PRAMET F.A.	80	100	0	125	200	125	63	. 2	75	125	21	57	200	0	8	0	23	ROSS
PRAMILET F.A.	80	100	0	75	200	125	63	115	75	125	19	57	133	2	8	NA	25	ROSS
PRENATE 90 TABS	160	100	200	250	200	212	125	769	300	125	21	86	300	0	100	100	0	BOCK
SECRAN PRENATAL TAB	160	100	200	75	113	125	125	96	200	125	21	0	200	0	0	0	0	SCHERER
STUART NATAL 1+1	160	100	200	113	167	188	125	385	300	125	17	86	217	22	0	0	0	STUART
ZENATE	100	100	200	100	200	188	125	385	300	125	25	100	217	22	0	100	0	REID PROVIDENT

* ***Percent calculated using 18 milligrams***

○ ***Percent calculated using 2 milligrams***

□ ***Percent calculated using 4 milligrams***

Vitamin/Mineral Content of Selected Over-The-Counter Prenatal Supplements

TABLE 3

OVER-THE-COUNTER (<1000 MCG FOLIC ACID)

	VIT A	VIT D	VIT E	VIT C	B-1	B-2	NIACIN	B-6	B-12	FOLATE	Ca	IODINE	IRON	Mg	Cu	Zn	PANTO	
RDA FOR	I.U.	I.U.	I.U.	MG	MG	MG	MG	MG	MCG	MCG	MG	MCG	MG	MG	MG	MG	MG	
ADULT PREGNANCY	5000	400	15	80	1.5	1.6	16	2.6	4	800	1200	175	18+	450	2-3	20	4-7	COMPANY
CAL-PRENAL IMPROVED	4000	400		50	2	2	10	1	2	400	230		49					VORTECH
CHROMAGEN OB-2CAPS	8000	400	30	150	3	3.4	20	10	12	800	250	300	66	25	2	25		SAVAGE LABS
FILABON	5000	400	30	60	1.5	1.7	20	2	6	400	125	150	18	100				LEDERLEE
FOSFREE	1500	150		50	5	2	10		2		176						1	MISSION PHARMACEUTICAL
HEMO-VIT				150	5	5	50	1	NA	200			60		0.4		NA	DRUG INDUSTRIES
IROMIN-G	4000	400		100	5	2	10	25	2	800	50		39				1	MISSION PHARMACEUTICAL
LIVITAMIN PRENATAL	6000	400		100	3	3	20	10	5	500							5	BEECHAM LABS
MISSION PRENATAL	4000	400		100	5	2	10	3	2	800	50		39				1	MISSION PHARMACEUTICAL
NATABEC KAPSEALS	4000	400		50	3	2	10	3	5		NA		30					PARK DAVIS
NATALINS	8000	400	30	90	1.7	2	20	4	8	800	200	150	45	100				MEAD JOHNSON
PRENAVITE	8000	400	30	60	1.7	2	20	4	8	800	200		60					RUGBY
STUART PRENATAL	8000	400	30	60	1.7	2	20	4	8	800	200	150	60	100				STUART

Blank spaces indicate 0 amount

NA: Not available

Percentage of RDA of Selected Over the Counter Prenatal Supplements

TABLE 4

OVER-THE-COUNTER (<1000 MCG FOLIC ACID)

	VIT A	VIT D	VIT E	VIT C	B-1	B-2	NIACIN	B-6	B-12	FOLATE	Ca	IODINE	IRON *	Mg	Cu ○	Zn	PANTO □	
RDA FOR	I.U.	I.U.	I.U.	MG	MG	MG	MG	MG	MCG	MCG	MG	MCG	MG	MG	MG	MG	MG	
ADULT PREGNANCY	5000	400	15	80	1.5	1.6	16	2.6	4	800	1200	175	18+	450	2-3	20	4-7	COMPANY
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
CAL-PRENAL IMPROVED	80	100	0	63	133	125	63	38	50	50	19	0	163	0	0	0	0	VORTECH
CHROMAGEN 08-2CAPS	160	100	200	188	200	212	125	385	300	100	21	171	220	6	100	125	0	SAVAGE LABS
FILABON	100	100	200	75	100	106	125	77	150	50	10	86	60	22	0	0	0	LEDERLEE
FOSFREE	30	38	0	63	333	125	63	0	50	0	15	0	0	0	0	0	25	MISSION PHARMACEUTICAL
HEMO-VIT	0	0	0	188	333	313	313	38	NA	25	0	0	200	0	20	0	NA	DRUG INDUSTRIES
IROMIN-G	80	100	0	125	333	125	63	962	50	100	4	0	130	0	0	0	25	MISSION PHARMACEUTICAL
LIVITAMIN PRENATAL	120	100	0	125	200	188	125	385	125	63	0	0	0	0	0	0	NA	BEECHAM LABS
MISSION PRENATAL	80	100	0	125	333	125	63	115	50	100	4	0	130	0	0	0	25	MISSION PHARMACEUTICAL
NATABEC KAPSEALS	80	100	0	63	200	125	63	115	125	0	NA	0	100	0	0	0	0	PARK DAVIS
NATALINS	160	100	200	113	113	125	125	154	200	100	17	86	150	22	0	0	0	MEAD JOHNSON
PRENAVITE	160	100	200	75	113	125	125	154	200	100	17	0	200	0	0	0	0	RUGBY
STUART PRENATAL	160	100	200	75	113	125	125	154	200	100	17	86	200	22	0	0	0	STUART

* ***Percent calculated using 18 milligrams***

○ ***Percent calculated using 2 milligrams***

□ ***Percent calculated using 4 milligrams***

Recommended Dietary Allowances (RDA's)

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES,[a] Revised 1980
Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Protein (g)	Fat-Soluble Vitamins: Vitamin A (μg RE)[b]	Vitamin D (μg)[c]	Vitamin E (mg α-TE)[d]	Water-Soluble Vitamins: Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg NE)[e]	Vitamin B-6 (mg)	Folacin[f] (μg)	Vitamin B-12 (μg)	Minerals: Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)	Iodine (μg)
Infants	0.0-0.5	6	13	60	24	kg × 2.2	420	10	3	35	0.3	0.4	6	0.3	30	0.5[g]	360	240	50	10	3	40
	0.5-1.0	9	20	71	28	kg × 2.0	400	10	4	35	0.5	0.6	8	0.6	45	1.5	540	360	70	15	5	50
Children	1-3	13	29	90	35	23	400	10	5	45	0.7	0.8	9	0.9	100	2.0	800	800	150	15	10	70
	4-6	20	44	112	44	30	500	10	6	45	0.9	1.0	11	1.3	200	2.5	800	800	200	10	10	90
	7-10	28	62	132	52	34	700	10	7	45	1.2	1.4	16	1.6	300	3.0	800	800	250	10	10	120
Males	11-14	45	99	157	62	45	1000	10	8	50	1.4	1.6	18	1.8	400	3.0	1200	1200	350	18	15	150
	15-18	66	145	176	69	56	1000	10	10	60	1.4	1.7	18	2.0	400	3.0	1200	1200	400	18	15	150
	19-22	70	154	177	70	56	1000	7.5	10	60	1.5	1.7	19	2.2	400	3.0	800	800	350	10	15	150
	23-50	70	154	178	70	56	1000	5	10	60	1.4	1.6	18	2.2	400	3.0	800	800	350	10	15	150
	51+	70	154	178	70	56	1000	5	10	60	1.2	1.4	16	2.2	400	3.0	800	800	350	10	15	150
Females	11-14	46	101	157	62	46	800	10	8	50	1.1	1.3	15	1.8	400	3.0	1200	1200	300	18	15	150
	15-18	55	120	163	64	46	800	10	8	60	1.1	1.3	14	2.0	400	3.0	1200	1200	300	18	15	150
	19-22	55	120	163	64	44	800	7.5	8	60	1.1	1.3	14	2.0	400	3.0	800	800	300	18	15	150
	23-50	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	18	15	150
	51+	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	10	15	150
Pregnant						+30	+200	+5	+2	+20	+0.4	+0.3	+2	+0.6	+400	+1.0	+400	+400	+150	[h]	+5	+25
Lactating						+20	+400	+5	+3	+40	+0.5	+0.5	+5	+0.5	+100	+1.0	+400	+400	+150	[h]	+10	+50

ASSESSMENT FORMS

PREGNANT WOMEN
- Nutrition Assessment
- Nutrition Questionnaire*
- WIC Medical Referral Form
- WIC Certification Form
- Prenatal Nutrition Guide*

POSTPARTUM WOMEN
- Nutrition Assessment
- Nutrition Questionnaire*
- WIC Medical Referral Form
- WIC Certification Form

INFANTS
- Infant Feeding Guide*

WOMEN AND CHILDREN
- WIC Dental Referral Form

* Available in Cambodian, Chinese, French, Laotian, Portuguese, Spanish and Vietnamese. Single copies may be requested from the Massachusetts WIC Program, 150 Tremont Street, 3rd floor, Boston, MA 02111.

NUTRITION ASSESSMENT FOR PREGNANT WOMEN

Name _____

Health Status

1. EDC _____. G___P___AB___
2. Hospitalization, Significant Illness or Handicap _____

   _____
3. Current Problems: Nausea___ Vomiting___ Heartburn___ Constipation___

   Other _____
4. Medications: Vitamins _____ Fe Supplements _____

   Other _____
5. Smoking: Yes___ No___ Frequency _____
6. Beer: _____ Wine: _____ Liquor: _____
7. Caffeine _____
8. Other Drugs _____

Nutrition Assessment

9. Present Infant Feeding Choice: Breast___ Bottle___ Both___ Undecided___
10. Previous Infant Feeding Practices _____
11. Living Situation _____
12. Food Stamps _____
13. Previously Seen by a Nutritionist or Dietitian? _____

    Advice Given _____
14. Appetite: Good___ Fair___ Poor___ Changed? _____
15. Food Allergies _____
16. Food Dislikes _____
17. Cravings/Pica _____
18. Diet Restrictions (When/Type) _____

(over)

"This is an Equal Opportunity Program. If you believe you have been discriminated against because of race, color, national origin, age, sex, or handicap, write immediately to the Secretary of Agriculture, Washington, D.C. 20250."

NUTRITION ASSESSMENT FOR PREGNANT WOMEN

Diet History

24-Hour Recall

Time

Food Group	Description & Amounts	Suggested # of Servings ADULT	Suggested # of Servings TEEN	(+ ✓)
Milk and Milk Products milk, cheese, yogurt		3-4	4-5	
Protein Foods meat, seafood, poultry eggs Meat alternatives (= 1 oz. meat) 1 c. rice + 1/4 c. beans 1 1/4 c. rice + 1 oz. tofu 2 slices bread (WW) + 2 tbsp. peanut butter 1/2 c. macaroni + 1 oz. cheese		2-3 serv. (3 oz. each)	2-3 serv. (3 oz. each)	
Cereal/Grain products bread, cereal, pasta, rice, grits		4	4	
Fruits and Vegetables Fruits Fruit Juices Vegetables		4	4	

Other Diet-Related Considerations	
Simple Sugar Sources:	Fat Sources:

NUTRITION QUESTIONNAIRE FOR PREGNANT WOMEN

Please answer the following questions. All information is confidential.

Name:_____ When is your baby due? _____

1. How many times have you been pregnant? _____ Have you ever had:

   a premature baby _____ an abortion _____

   a newborn baby weighing less than 5 lbs. 8oz. _____ a stillbirth _____

   a miscarriage _____ Other _____

2. Check (✓) any problems you are now having: Nausea _____ Vomiting _____

   Heartburn ____ Constipation ____ Diarrhea ____ Other _____

3. How is your appetite now? Good ____ Fair ____ Poor ____

   Has it changed since you became pregnant? Bigger ____ Smaller ____ Same ____

4. Check (✓) how often you take:

	One a day	Two a day	Three a day	Sometimes	Never
Prenatal vitamins	_____	_____	_____	_____	_____
Iron pills	_____	_____	_____	_____	_____

5. Please list other medicine or drugs you take, even if you only take it once in a while (include everything - aspirin, antacids, cold tablets, other vitamins, etc.):

   _____

6. Do you smoke cigarettes? Yes ____ No ____ How much? _____

   Are you trying to quit? Yes ____ No ____

7. Check (✓) how often and how much you drink:

	Daily	Weekly	Sometimes	Never	How Much
Beer, wine, liquor	___	___	___	___	_____
Coffee	___	___	___	___	_____
Tea	___	___	___	___	_____
Cola drinks	___	___	___	___	_____
Diet drinks	___	___	___	___	_____

8. Who have you talked with about what to eat during your pregnancy:

   Doctor ____ Midwife ____ Nurse ____ Nutritionist ____ Family ____ Friends ____

   What was the advice? _____

9. If you have food allergies, what are they? _____

10. Is there anything you are craving during this pregnancy? _____

11. Have you ever been on a special diet? Yes_____ No _____ When? _____

    What kind? _____

12. Do you have a working stove? Yes_____ No_____ Oven? Yes_____ No_____

    Refrigerator? Yes_____ No_____ Other? _____

13. Check (✓) your choice of infant feeding:

	Breast	Bottle	Both	Undecided
This baby	____	____	____	____
Your other children	____	____	____	

14. Please list other topics you are interested in. _____

    _____

MA WIC 5/88
WIC Form #11

NUTRITION QUESTIONNAIRE FOR PREGNANT WOMEN

Please check off the foods you eat during a week, use the blank lines to write in the kind of food.

Example: I eat ½ cup of mashed potatoes 3 days a week and an 8-ounce glass of milk a day. (1 cup = 8 ounces)

	DAYS A WEEK	HOW MUCH EACH DAY?	PLEASE DO NOT WRITE HERE		
			x/7	STAN-DARD	+✓
Potatoes: mashed	1 2 (3) 4 5 6 7	¼ (½) 1 1½ 2 cups			
Milk: low-fat	1 2 3 4 5 6 (7)	(1) 2 3 4 5 6 7 8 cups			
Beef/pork	1 2 3 4 5 6 7	1 2 4 6 8 ounces		14/7	
Chicken	1 2 3 4 5 6 7	1 2 4 6 8 ounces			
Fish/tuna fish	1 2 3 4 5 6 7	1 2 4 6 8 ounces			
Eggs	1 2 3 4 5 6 7	1 2 3 4 5 6 eggs			
Peanut butter	1 2 3 4 5 6 7	1 2 3 4 5 6 7 tbsp			
Cottage Cheese:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Tofu	1 2 3 4 5 6 7	1 2 3 4 5 6 ounces			
Baked and other beans	1 2 3 4 5 6 7	¼ ½ 1 1½ 2 cups			
Casseroles:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Soups:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Hot dogs/cold cuts	1 2 3 4 5 6 7	1 2 3 4 pieces			
Bacon/sausage	1 2 3 4 5 6 7	1 2 3 4 pieces			
Milk:_____	1 2 3 4 5 6 7	¼ 1 2 3 4 5 6 7 8 cups		21/7 A 28/7 T	
Cheese	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 slices			
Yogurt	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Ice Cream	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Juice:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 2½ 3 cups		28/7	
Fruit:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 3 pieces			
Carrots, sweet potato, spinach, winter squash, broccoli	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Potatoes:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Other vegetables:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Cereal:_____	1 2 3 4 5 6 7	¼ 1 1½ 2 cups		28/7	
Bread/muffins/pancakes	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 pieces			
Rice/noodles/spaghetti	1 2 3 4 5 6 7	¼ 1 1½ 2 cups			
Crackers	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 crackers			
Chips	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 bags			
Popsicles	1 2 3 4 5 6 7	¼ 1 1½ 2 popsicles			
Donuts/cake/cookies	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 pieces			
Candy/gum	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 pieces			
Kool-aid/punch/tonic/soda	1 2 3 4 5 6 7	1 2 3 4 5 6 cups			
Coffee (regular), tea	1 2 3 4 5 6 7	1 2 3 4 5 6 7 8 cups			

Massachusetts WIC Program

MEDICAL REFERRAL FORM
PREGNANT WOMEN

Program Use Only

	Date	Init.	Reviewed
Received			Date
Appt. Made			CPA
Waiting List Letter			Priority
Appt.		No Show	Resch
Appt.		No Show	Resch

APPLICANT FILLS OUT THIS BOX

I give permission to _____
Name of physician, nurse or clinic

to release the following information from my records. [Please Print]

_____
Name

/ /
Date of birth Age

Return to: _____ (Agency stamp)

_____
Signature

_____
Address

_____ MA
City Zip code

( )
Telephone Area code

How did you hear about WIC?

_____

MEDICAL PROVIDER:

PLEASE FILL OUT THIS FORM COMPLETELY. The eligibility of this person will be jeopardized without a complete and accurate form.

OBSTETRICAL HISTORY EDC _____ G ____ P ____ EAB/TAB ____ SAB____

I. Previous Pregnancies

Date of Delivery or Termination (mon./yr.)	Gestational Age	Birthweight	Pounds Gained	Comments re: outcome

II. PLEASE PROVIDE INFORMATION THAT IS LESS THAN 60 DAYS OLD.

Pregravid weight _____

Date of first prenatal visit _____

Present weight _____

height _____

Date of measurements _____

Hematocrit or Hemoglobin or FEP	_____	Date _____
	_____	Date _____
	_____	Date _____
Lead	_____	Date _____

WIC Form #20
MA. WIC 11/88

MEDICAL REFERRAL FORM - PREGNANT WOMEN

III. Check any of the following that apply:

this pregnancy	previous pregnancy		this pregnancy	previous pregnancy	
☐	☐	Preeclampsia/Eclampsia	☐	☐	Placenta praevia
☐	☐	Excessive edema	☐	☐	Hyperemesis gravidarum
☐	☐	Hypertension	☐	☐	Pica
☐	☐	Iron-deficiency anemia	☐	☐	Other:_____
☐	☐	Excessive/Inadequate weight gain			

CURRENT MEDICAL HISTORY — Check any of the following that apply.

- ☐ Cardiac, hypertensive, renal, gastro-intestional or other chronic conditions (specify: _____)
- ☐ Metabolic disorders (specify: _____)
- ☐ Frequent episodes of infectious disease (e.g. Hepatitis, parasites, AIDS/ARC, HIV infection, upper respiratory infections)
- ☐ Food allergy or intolerance (Specify: _____)
- ☐ Lactose intolerance
- ☐ Gestational diabetes
- ☐ Folic acid deficiency
- ☐ Poor oral health
- ☐ Lead poisoning
- ☐ Cigarette smoking
- ☐ Drug Abuse
- ☐ Alcohol Abuse
- ☐ None apply

ADDITIONAL COMMENTS

1. Have you prescribed vitamin supplements?
   - Prenatal vitamins ☐
   - Iron ☐
   - Folic acid ☐
2. What other medication is prescribed? _____
3. Other Risks: _____

☐ Please check if you would like a copy of the WIC nutrition assessment or further information on your patient's WIC nutrition care.

_____ Signature of physician/nurse/nutritionist

_____ Name (please print)

_____ Date

_____ Health Center or Hospital

_____ Address

_____ City

_____ ( ) Telephone Area Code

Massachusetts WIC Program

CERTIFICATION FORM
PREGNANT WOMEN

ID#

Name _____

Date of Birth _____ Age _____

Health Care _____

Primary Language _____ Race _____

EDC _____ Wks. Gestation At Cert. _____ Trimester At Cert. ____

Infant Feeding Preference:

Breast___ Bottle___ Both___ Undecided___

Prev. Infant Feeding Prac._____

S:

O: G__P__AB___ Current Wt. _____

Ht._____ Pregravid Wt. _____

Hct. _____ Hgb. _____ Date _____

A:

Tailoring Rationale _____ Food Pkg._____

P:___Prenatal Diet ___High wt.gain ___Low Wt. Gain ___Low HCT ___Nausea
___Constipation ___Heartburn ___Smoking ___Drug Abuse ___Breastfdg. ___Infant Fdg.
___Labor & Delivery ___Vit/Min.Supp. ___Therapeutic Diet_____
___Other_____

Referral _____

Certified? Yes ___ No ____ Priority _____ Pick up Date _____

Reason _____

Date of Certification _____ Signature _____

Second Contact: Date Offered _____ N/S Initials _____

Topic/Progress Note

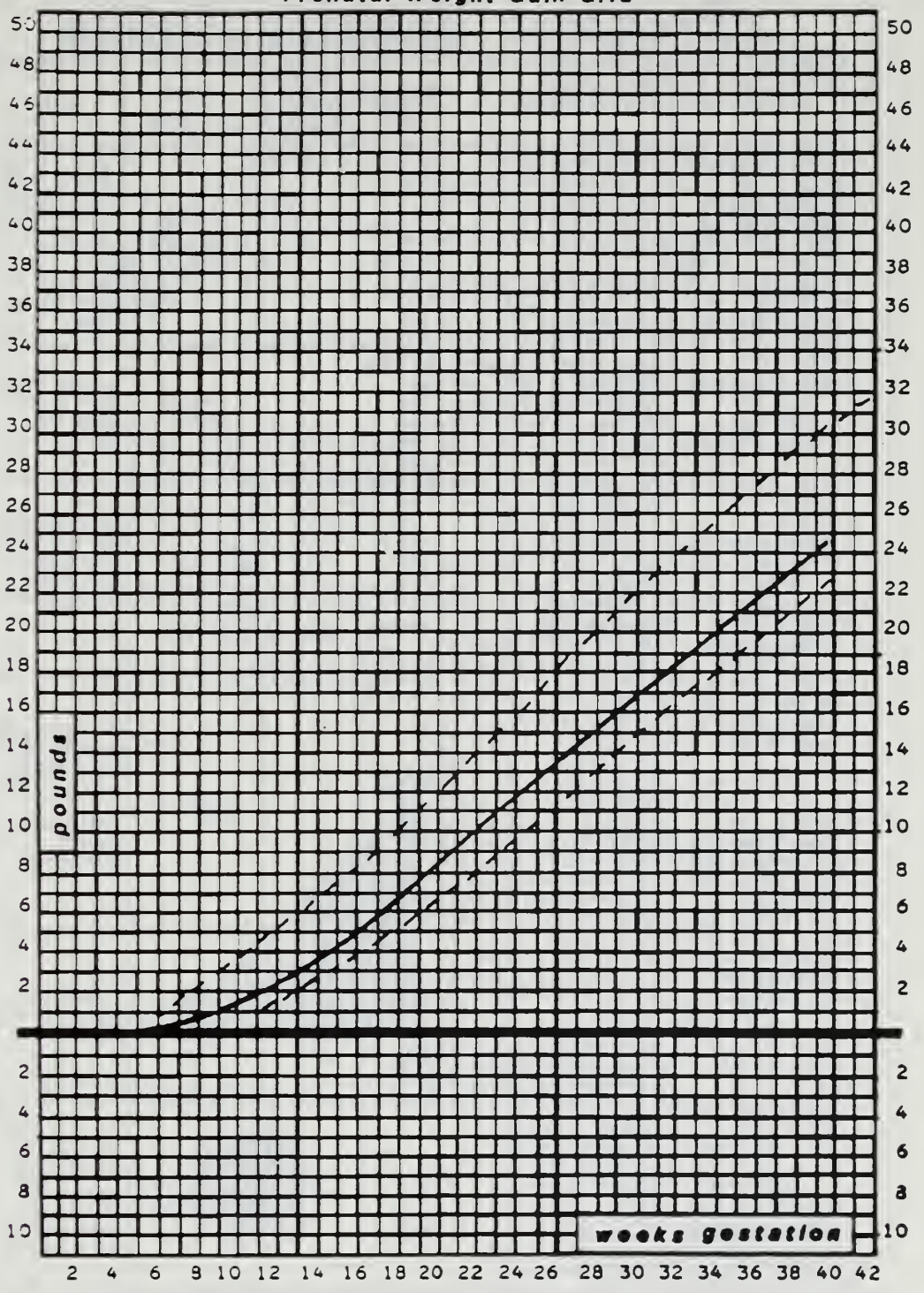
___Diet ___High wt. gain ___Low wt. gain ___Low Iron Blood ___Nausea ___Constipation
___Heartburn ___Smoking ___Drug Abuse ___Breastfdg. ___Infant fdg. ___Labor & Delivery
___Therapeutic Diet ___Other_____

Mass. WIC 1/8
WIC Form #9

Certification Form - PREGNANT WOMEN

PLOT REQUIRED FOR CERTIFICATION

Prenatal Weight Gain Grid



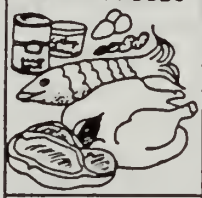
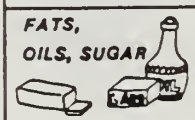
Weight History

Ht. _____ Pregravid Wt. _____

Date	# Wks. Gest.	Weight	Weight Gained

Progress Note
(Optional)

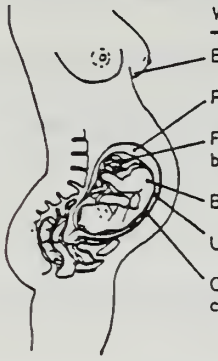
Prenatal Feeding Guide

FOOD GROUP	FOOD SOURCES	SERVING SIZE	NUMBER OF SERVINGS PER DAY	MAJOR NUTRIENTS	WHY?
PROTEIN FOODS 	Poultry, lean meat, fish, liver	2 oz.	3 •	Protein Iron	Protein is the basic building material for the growth of your baby. Iron helps build healthy blood.
	Eggs	2			
	Dried peas, beans, lentils	½ cup cooked			
	Nuts and seeds	½ cup			
	Peanut butter	4 Tbs.			
	Tofu (soybean curd)	3 oz.			
	Cottage cheese	½ cup			
MILK and MILK PRODUCTS	Whole, lowfat, skim milk (8 oz)	1 cup	4 •	Calcium Protein	Calcium helps build strong bones and teeth.
	Evaporated or nonfat dry milk (mixed with water)	1 cup			
	Cheese	1½-2 oz.			
	Yogurt	1 cup			
	Ice cream	1½ cup			
BREADS and CEREALS (whole grain/ enriched)	Bread	1 slice	4	Iron B-Vitamins Carbohydrates Fiber	Carbohydrates and B-vitamins provide you with energy and help your body work properly.
	Cereal, rice, macaroni, spaghetti, noodles, cooked	½ cup			
	Cereal, ready to eat	3/4 cup			
	Rolls, buns, bagels, muffins	½			
	Pancakes	1 medium			
	Corn or flour tortilla	1			
	Crackers	5			
VITAMIN C- RICH FRUITS and VEGETABLES	Orange	1	1	Vitamin C Fiber	Vitamin C keeps gums healthy and helps your body use iron. Fiber helps prevent constipation.
	Orange, grapefruit juice	½ cup			
	Grapefruit	½			
	Strawberries	½ cup			
	Cantaloupe	½ medium			
	Papaya	1 cup			
	Broccoli	1 stalk			
	Cabbage	½ cup			
	Tomato	1			
	Tomato juice	1 cup			
	Peppers	½ medium			
	Baked potato	1 medium			
VITAMIN A- RICH DARK GREEN VEGETABLES **DEEP YELLOW VEGETABLES**	Spinach, collards, kale, mustard greens	½ cup	1	Vitamin A Fiber	Vitamin A keeps eyes and skin healthy.
	Bok choy, swiss chard	½ cup			
	Broccoli	2 stalks			
	Carrots	1 cup			
	Winter squash	1 cup			
	Sweet potato	1 small			
	Cantaloupe	½ melon			
OTHER FRUITS and VEGETABLES	Cucumber, Corn, green beans, peas, Lettuce, Apple, Applesauce, Banana, Grapes, Plums	½ cup or 1 small piece	2	Other vitamins and minerals	All fruits and vegetables provide other vitamins and minerals to make the body work properly.
FATS, OILS, SUGAR 	Mayonnaise, butter, margarine, salad dressing, lard, candy, pastry, cookies, chips, Kool-aid, soda (tonic), fruit punch		TO BE USED IN LIMITED AMOUNTS		These foods are high in calories, sugar, fat and salt.

WATER AND OTHER LIQUIDS: Drink 6 to 8 glasses every day.

• Pregnant teenagers should add one more serving of protein foods and one more serving of milk products to the above recommendations per day.

WEIGHT GAIN FOR YOU AND YOUR BABY

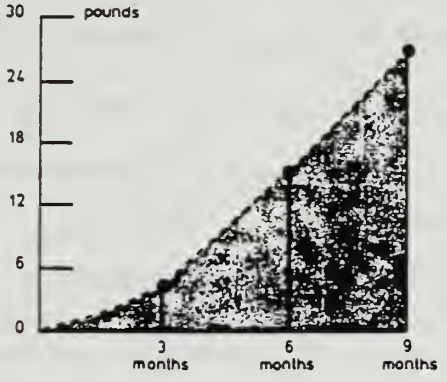


Where the weight goes	
Breasts	1 lb.
Placenta	1.4 lbs.
Fluids & blood volume	8.3 lbs.
Baby	7.5 lbs.
Uterus	2.1 lbs.
Other body changes	7.2 lbs.
	27.5 lbs.

The amount of weight you should gain depends on your weight before you were pregnant. If you were underweight, you should gain more. If you were overweight, you should gain less but you still need to gain some weight for the health of your baby. Check with your nutritionist or health care provider for the appropriate weight gain for you.

PATTERN OF GAIN

For the first three months, you should gain about 2 to 4 pounds. During the last six months, you should gain about 1 pound per week.



Your unborn baby is NOT protected from cigarettes, alcohol and drugs. Don't force your baby to smoke, drink or take drugs. Treat your unborn baby as you would a newborn - with care!

NAUSEA/VOMITING

Nausea and/or vomiting may occur in the early months of pregnancy. Some suggestions for relief:

- before getting out of bed, have plain toast or crackers and then get up slowly
- eat when you feel hungry, try 5 or 6 small meals rather than 2 or 3 large meals
- eat slowly
- avoid greasy, fried or spicy foods
- drink fluids between meals rather than with meals
- drink a small amount of 100% fruit juice

If severe vomiting continues, see your physician.

CONSTIPATION

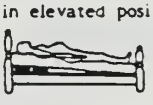
Constipation sometimes occurs during pregnancy. Some suggestions for relief:

- eat high fiber foods such as: fresh fruits, vegetables, whole grain bread and cereals with bran, and beans such as kidney or pinto
- drink plenty of fluids; water and 100% fruit juices
- increase your activity - such as walking

HEARTBURN

Heartburn may occur as the baby grows and pushes on the stomach. Some suggestions for relief:

- eat small, frequent meals
- decrease coffee and tonic
- avoid taking antacids - try plain crackers between meals
- avoid bothersome foods (fried, fatty, spicy foods, coffee and tonic)
- eat 2-3 hours before bed rather than immediately before bedtime
- sleep in elevated position



NUTRITION EDUCATION TASK FORCE Massachusetts WIC Program WIC Form #75

This is an Equal Opportunity Program. If you believe you have been discriminated against because of race, color, national origin, age, sex, or handicap, write immediately to the Secretary of Agriculture, Washington, D.C. 20250.

NUTRITION ASSESSMENT FOR POSTPARTUM & LACTATING WOMEN

Name _____

Pregnancy Outcome

1. Labor and Delivery (Medications, Anesthesia, Type of Delivery, Complications, Feelings) _____

_____

_____

2. Infant Feeding: Breast ___ Bottle ___ Both ___

Breastfeeding Concerns: Milk Supply ___ Leaking ___ Sore Nipples ___ Fatigue ___

Expressing Milk ___ Comments _____

_____

Health Status

3. Health Care _____
4. Current Health Status _____
5. Weight History: Ht. _____ Current Wt. _____ Preferred Wt. _____

Weight Loss Plans? _____

6. Usual Physical Activity: Type _____

Level: Sedentary _____ Light _____ Moderate _____

7. Medications: Vitamins _____ Fe Supplements _____

Other _____

8. Smoking: Yes ___ No ___ Frequency _____
9. Beer: _____ Wine: _____ Liquor: _____
10. Caffeine _____
11. Other Drugs _____

Nutrition Assessment

12. Appetite: Good ___ Fair ___ Poor ___ Typical? _____
13. Food Allergies _____
14. Food Dislikes _____

Mass. WIC 10/85 WIC Form #7

NUTRITION ASSESSMENT FOR POSTPARTUM & LACTATING WOMEN

Diet History

24-Hour Recall

Time

Food Group	Description & Amounts	Suggested # of Servings BF	Suggested # of Servings PP	(+ ✓)
Milk and Milk Products milk, cheese, yogurt		4	2	
Protein Foods milk, seafood, poultry, eggs Meat alternatives (= 1 oz. meat) 1 c. rice + 1/4 c. beans 1 1/4 c. rice + 1 oz. tofu 2 slices bread (WW) + 2 tbsp. peanut butter 1/2 c. macaroni + 1 oz. cheese		2-3 serv. (3 oz. each)	2-3 serv. (3 oz. each)	
Cereal/Grain Products bread, cereal, pasta, rice, grits		4	4	
Fruits and Vegetables Fruits Fruit Juices Vegetables		4	4	

Other Diet-Related Considerations
Simple Sugar Sources: Liquids: Fat Sources:

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NUTRITION QUESTIONNAIRE FOR POSTPARTUM & LACTATING WOMEN

Name _____

1. Where do you go now for your health care? _____

2. Please describe any problems or complicatgions you had during or after this delivery:

_____

3. How are you feeding your baby? Breast ___ Bottle ___ Both ___

If you are using a bottle, what are you putting in it? _____

If you are breastfeeding and also using a bottle, how much formula/milk does your baby drink in a day? _____

If you are breastfeeding, do you have any concerns about: Milk supply ___
Sore nipples __ Leaking __ Tiredness __ Other _____

4. List any health problems you are having (include colds, flu, etc.): _____

_____

****

5. How much did you weigh before this pregnancy? _____

6. How much do you weigh now? _____ What would you like to weigh? _____

7. Are you trying to lose weight now? Yes ___ No ___

8. Are you planning to lose weight in the future? Yes __ No __

9. Do you usually get exercise? Yes __ No __ What kind? _____

10. Do you take vitamins? Yes __ No __ Iron pills? Yes __ No ___

11. Please list any other medicine or drugs you take, even if you take it occasionally (include everything - aspirin, antacids, cold tablets, etc.):

_____

12. Do you smoke cigarettes? Yes __ No __ How much? _____

13. How often do you drink any beer, wine or liquor? _____

14. How often do you drink tonic/soda? _____

15. How often do you drink coffee or tea? _____

****

16. How is your appetite now? Good ___ Fair ___ Poor ___

17. Do you have any food allergies? _____

18. Are there any foods or beverages that you dislike? _____

(over)

MA WIC 10/85 WIC Form #8

NUTRITION QUESTIONNAIRE FOR POSTPARTUM & LACTATING WOMEN

19. Please indicate the foods you eat by listing how often you eat these foods (once or twice a day, 3 times a week, etc.); how much of these foods you eat (1 cup, etc.); and the types you like and usually eat.

ITEM	HOW OFTEN?	HOW MUCH?	WHAT KINDS?
Meat (including beef, pork, chicken and fish)			
Liver			
Eggs			
Peanut butter			
Beans (baked or kidney			
Bacon/Sausage			
Cold cuts/Luncheon meats			
Milk			
Cheese			
Yogurt			
Ice cream			
Fruits			
Vegetables			
Fruit juices			
Bread/Rolls			
Cereals			
Whole grains			
Rice/Spaghetti/Noodles			
Crackers			
Candy			
Cookies/Cake/Pie			
Salted snacks/Chips			
Kool-aid/Fruit punch			
Water			
Other			

20. Please check any nutrition-related questions you may have:

___ When and how to lose weight
___ What ato do with a fussy baby
___ When and how to start my baby on solid foods
___ How to avoid overfeeding my baby
___ Other _____
___ What foods to eat when nursing
___ How often to nurse
___ How to know if I have enough milk
___ How to breastfeed and work too
___ When and how to wean

Thank You

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Massachusetts WIC Program

MEDICAL REFERRAL FORM

POSTPARTUM & LACTATING WOMEN

Program Use Only

	Date	Init.	Reviewed
Received			Date
Appt. Made			CPA
Waiting List Letter			Priority
Appt.			No Show Resch
Appt.			No Show Resch

Applicant fills out:

I hereby authorize _____
Name of referring physician, nurse or clinic

to release the following information from my records.

_____ Name

_____ Signature

__/__/__ Date of birth Age

_____ Address

Return to:

_____ City MA Zip code

(Agency stamp)

_____ Telephone Area code

How did you hear about WIC?_____

* * * *

MEDICAL REFERRAL FORM - POSTPARTUM & LACTATING WOMEN

MEDICAL HISTORY

Check any of the following that apply.
If none apply, check "None apply".

- ☐ Cardiac, hypertensive, renal, gastro-intestinal or other chronic conditions (specify: _____)
- ☐ Metabolic disorders (specify: _____)
- ☐ Frequent episodes of infectious disease (E.g., Hepatitis, parasites, AIDS/ARC, HIV infection, Tuberculosis)
- ☐ Food allergy or intolerance (specify: _____)
- ☐ Lactose intolerance
- ☐ Poor oral health
- ☐ Lead poisoning
- ☐ Cigarette smoking
- ☐ Drug abuse
- ☐ Alcohol Abuse
- ☐ None apply

ADDITIONAL COMMENTS

1. Is this woman: breastfeeding? ____ bottlefeeding? ____ both? ____

2. Have you prescribed vitamin supplements?

   Vitamins ☐

   Iron ☐

3. What other medication have you prescribed? _____

4. Are you aware of any conditions that predispose this woman to inadequate nutrition? Please describe. _____

   _____

☐ Please check if you would like a copy of the WIC nutrition assessment or further information on your patient's WIC nutrition care.

_____ Signature of physician/nurse/nutritionist

_____ Name (please print)

_____ Date

_____ Health Center or Hospital

_____ Address

_____ City

_____ ( ) Telephone Area code

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Massachusetts WIC Program

CERTIFICATION FORM
POSTPARTUM & LACTATING WOMEN

ID#

Name _____ Delivery Date _____ Sex: M__ F__

Date of Birth _____ Age _____ Infant's Name _____

On WIC as Prenatal? Yes __ No __ Infant's Birth Weight _____

Health Care _____ Infant Feeding: Breast ___ Bottle ___ Both ___

Primary Language _____ Race _____

S:

O: Ht. _____ Wt. _____ Date _____

Total Weight Gain _____

Hct. _____ Hgb. _____ Date _____

A:

Tailoring Rationale _____ Food Package _____

P:

___Appropriate Diet ___Weight Control ___Breastfdg Concerns ___Smoking/Drug Abuse
___Family Planning ___Weaning ___Vit/Min Supplement
___Other_____

Referral _____

Certified? Yes __ No __ Priority _____ Pick up Date _____ Infant Assessed? Yes __ No __

Reason _____

Date of Certification _____ Signature _____

Second Contact: Date Offered _____ N/S Initials _____
Topic/Progress Note

S: O: Ht. _____ Wt. _____ Date _____

A: Hct. _____ Hgb. _____ Date _____

Tailoring Rationals _____ Food Package _____

P:
Referral _____

Certified? Yes ___ No ___ Priority _____ Pick up Date _____

Reason _____

Date of Certification _____ Signature _____

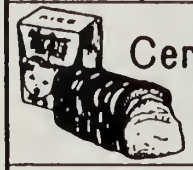
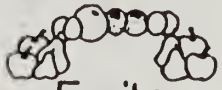
Second Contact: Date Offered _____ N/S Initials _____
Topic/Progress Note

Mass. WIC 1/88
WIC Form #6

Certification Form - POSTPARTUM & LACTATING WOMEN

PROGRESS NOTES

INFANT FEEDING GUIDE

FOODS / MONTHS	0–4 MONTHS	4–6 MONTHS	6–8 MONTHS	8–10 MONTHS	10–12 MONTHS
Breastmilk	Short frequent feedings 8 or more per day	Short frequent feedings 5 or more per day	On Demand 5 or more feedings	On Demand	On Demand
or Iron–Fortified Formula	16-32 ounces 5-10 feedings per day	24-40 ounces 4-7 feedings per day	24-32 ounces 3-4 feedings per day	16-32 ounces 3-4 feedings per day Can wean now from the bottle	16-24 ounces 3-4 feedings per day Whole milk can be offered now
 Cereals & Bread	NONE	Boxed rice, oatmeal or barley (spoonfed) Mix 2-3 teaspoons with formula, water or breastmilk	Most varieties of boxed infant cereal Avoid cereals that are pre-mixed with formula, fruit or honey (1-4 tablespoons, twice a day)	Infant cereals, Cream of Wheat or other plain hot cereals Toast, bagel or crackers Good for teething	Hot or cold unsweetened cereals Bread Rice Noodles or spaghetti
Fruit Juices	NONE	Infant juice Adult apple juice Vitamin-C fortified (Avoid orange & tomato juice now) (2-4 ounces per day)	Infant juice Adult apple juice, Vitamin-C fortified Offer juice from a cup (4 ounces per day)	All 100% juices Orange and tomato juice can be offered now	All 100% juices from a cup
Vegetables	NONE	NONE	Strained or mashed vegetables Dark yellow or orange (avoid corn) Dark green (½-1 jar or ½ cup per day)	Cooked and mashed, fresh or frozen vegetables	Cooked vegetable pieces May have some raw vegetables if child can chew them well
 Fruits	NONE	NONE	Fresh or cooked fruits Mashed bananas Applesauce Strained fruits (1 jar or ½ cup per day)	Peeled, soft fruit wedges Bananas, peaches, pears, oranges, apples	All fresh fruits, peeled and seeded Canned fruits, packed in water or its' own natural juice
Protein Foods	NONE	NONE	Try plain yogurt Can be mixed with soft, fresh fruit or applesauce	Lean meat, chicken and fish (strained, chopped or small tender pieces) Egg yolk Yogurt Mild cheese Cooked dried beans	Small tender pieces of meat, fish or chicken Whole egg Cheese Yogurt Cooked dried beans Peanut butter

Massachusetts WIC Program Nutrition Education Task Force Revised 11/85 WIC Form #47

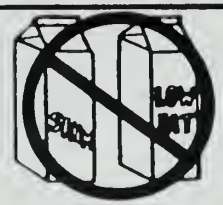
Some things to remember...

EVERY BABY IS DIFFERENT.
CONSULT YOUR DOCTOR OR NUTRITIONIST TO MAKE SURE YOUR BABY IS GETTING WHAT HE/SHE NEEDS.

A BABY'S BOTTLE IS FOR WATER, FORMULA AND 100% JUICE ONLY.

Poor eating habits may result from putting food in the bottle.

Avoid soda (tonic) and fruit drinks; Kool-aid, Hi-C, Hawaiian Punch, Zarex and Tang. They are full of sugar and food coloring.

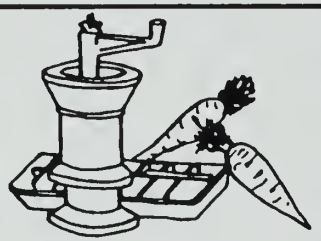


WHEN YOU START TO OFFER MILK, USE WHOLE MILK.

Skim or lowfat milk should not be given to any child less than 2 years old because

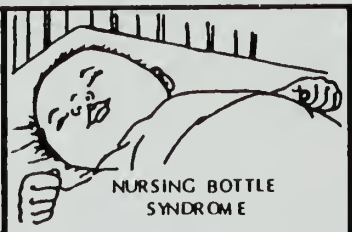
- it does not have enough fat for the brain and nerves to grow;
- it may not have enough calories for growth.

DO NOT FEEL PRESSURED TO START SOLID FOODS BEFORE 4 MONTHS. THE BABY'S DIGESTIVE SYSTEM IS NOT YET FULLY DEVELOPED TO DIGEST SOLID FOODS.



YOU CAN MAKE YOUR OWN BABY FOODS. THEY COST LESS AND CAN BE BETTER FOR YOUR BABY.

- Sugar, butter and salt should not be added to your baby's food.
- Ask your nutritionist how to prepare your own baby foods.



NURSING BOTTLE SYNDROME

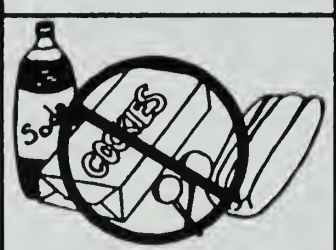
DON'T PUT YOUR BABY TO BED WITH A BOTTLE BECAUSE

- it can cause ear infections,
- it can hurt their teeth by causing tooth decay (cavities) and
- it is a hard habit to break.

BUY PLAIN MEATS, VEGETABLES AND FRUITS - YOU GET MORE FOR YOUR MONEY.

- Combination dinners contain added water and starch fillers.
- You can mix meats and vegetables together if your baby prefers them that way.

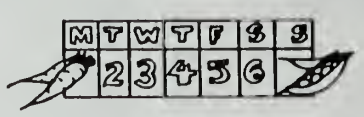
USE A BABY SIZE SPOON TO FEED YOUR BABY SMALL AMOUNTS AT FIRST. MAKE THE FOOD THIN AND SMOOTH BY MIXING IT WITH A LITTLE FORMULA, BREASTMILK OR WATER.



FOODS TO AVOID

- MIXED DINNERS
- BACON, LUNCHEON MEATS, HOT DOGS, HAM
- CREAMED VEGETABLES
- FRUIT DESSERTS
- PUDDINGS
- COOKIES, CANDY, CAKES
- SWEETENED DRINKS

These foods are high in fat and sugar and contain few nutrients for your money.



ADD ONE NEW FOOD AT A TIME. WAIT ABOUT 5 DAYS BEFORE YOU TRY ANOTHER ONE.

- This will give your baby time to get used to the new food.
- If your baby has a reaction, you will know which food caused it.

THE BEST FOODS

- PLAIN FRUIT
- PLAIN MEATS
- PLAIN VEGETABLES
- EGGS
- 100% FRUIT JUICES
- UNSALTED CRACKERS
- RICE
- NOODLES, SPAGHETTI
- WHOLE WHEAT BREAD
- HOT OR COLD UNSWEETENED CEREALS
- PLAIN YOGURT
- COTTAGE CHEESE

This is an Equal Opportunity Program. If you believe you have been discriminated against because of race, color, national origin, age, sex, or handicap, write immediately to the Secretary of Agriculture, Washington, D.C. 20250.

Massachusetts WIC Program

DENTAL REFERRAL FORM

WOMEN AND CHILDREN

Applicant fills out this box

I give permission to: _____
Name of dentist

to release the following information on _____
Name of woman or child

born on _____ _____
Date of birth Age

Return to:

(Agency Stamp)

_____
Signature

_____
Address

_____ MA _____
City Zip code

_____ ( )
Telephone Area code

DENTAL PROVIDER

TREATMENT CATEGORY: Please check that apply:

☐ 1. No obvious need for dental treatment

☐ 2. In need of minor dental treatment

3. In need of dental treatment because of one or more of the following:

- ☐ Four or more cavities
- ☐ Two large cavities possibly involving the pulp
- ☐ Advanced severe periodontitis
- ☐ Fewer than six occluding natural or artificial posterior teeth

☐ 4. In need of immediate dental care due to pain or infection

A dental appointment has been made: Yes _____ No _____

Date of appointment _____

Date treatment shall be completed _____

_____
Signature of dentist

_____
Name (please print)

_____
Date

_____
Health Center or Hospital

_____
Address

_____
City

_____ ( )
Telephone Area code

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WIC Form #23
MA WIC 4/88